Skema, Viktoras W.
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Mineral Resource Report 94
Part 1
1988

COAL RESOURCES OF WESTMORELAND COUNTY, PENNSYLVANIA

PART 1. COAL CROP LINES, MINED-OUT AREAS, AND STRUCTURE CONTOURS

Viktoras W. Skema

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Mineral Resource Report 94
Part 1

COAL RESOURCES OF WESTMORELAND COUNTY, PENNSYLVANIA

PART 1. COAL CROP LINES, MINED-OUT AREAS, AND STRUCTURE CONTOURS

by Viktoras W. Skema
Pennsylvania Geological Survey

PENNSYLVANIA GEOLOGICAL SURVEY

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Coal resources of
Westmoreland County

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COAL RESOURCES OF WESTMORELAND COUNTY, PENNSYLVANIA

PART 1. COAL CROP LINES, MINED-OUT AREAS, AND STRUCTURE CONTOURS

by
Viktoras W. Skema

INTRODUCTION

An important function of the Bureau of Topographic and Geologic Survey is to provide accurate, timely information on Pennsylvania's bituminous coal. To achieve this goal, the Bureau is working in cooperation with the U.S. Geological Survey to establish the National Coal Resources Data System (NCRDS). NCRDS is a computer data system developed by the U.S. Geological Survey to facilitate coal-resource calculations for the nation on a county-by-county and seam-by-seam basis, and to produce various kinds of tables and maps of coal characteristics.

Before NCRDS can be used for a particular bituminous-coal-producing county, all available data on the coal must be entered into the computer system. These data include site-specific (point-location) stratigraphic measurements and coal analyses, and specific map elements compiled on 7½-minute topographic quadrangle maps. The map elements, which include coal outcrop lines, structure contours, and mined-out areas, are digitized and stored in the system for subsequent computer manipulations.

The maps in this report represent part of phase one of NCRDS for Pennsylvania. Phase two will include the various computer-generated tables and maps of coal characteristics for the state. As the data base for each county is completed and the various derivative tables and maps of coal quality are produced, their availability will be publicly announced.

Inasmuch as the maps showing coal outcrop lines and mined-out areas are in constant demand by many users, including the coal industry, consultants, planners, government personnel, and academicians, they are being made available in this publication. These maps will be of considerable help in planning exploration programs, land acquisition, land use planning, and environmental protection.

Two kinds of coal maps may be included for each 7½-minute quadrangle covering Westmoreland County (Figure 1). First, for each of the principal coal seams in a given quadrangle, there may be an individual map showing (1) the coal outcrop (crop line), and (2) the extent of all known strip and deep mining up to the time of compilation (1986). Individual coal crop line maps are limited to those quadrangles where a coal has been mined and the extent of mining is known. Second, for each quadrangle, there is a composite map showing the crop lines of all of the principal coal seams (Figure 2), structure contours, and fold axes. The composite maps include crop lines of the Washington, Waynesburg, Redstone, Pittsburgh, Brush Creek, Mahoning, Upper Freeport, Upper Kittanning, Middle Kittanning, Lower Kittanning, Clarion, Brookville, and Mercer coals. Several other coals that are very thin or missing over most of the county and that have had very limited mining activity are shown on the composite maps only in those areas where they have been mined. These include the Little Waynesburg coal north of the town of Mount Pleasant, the Sewickley coal near Wilpen and along the Latrobe and Greensburg synclines, the Lower Bakerstown coal along the Fayette anticline near Jacobs Creek, the Lower Freeport coal near Latrobe, and the Lower Kittanning rider coal in the New Florence area. The composite maps also include structure contours on three separate datums: (1) the base of the Pittsburgh coal; (2) the base of the Upper Freeport coal; and (3) the base of the Lower Kittanning coal. In the areas of the county where these datums are shown, they represent the geologic horizons for which the most accurate structural control could be established.

All of the maps contain information on sources of data, map reliability, and map symbols. In addition, the composite maps contain information on structure-contour intervals and datums, and names

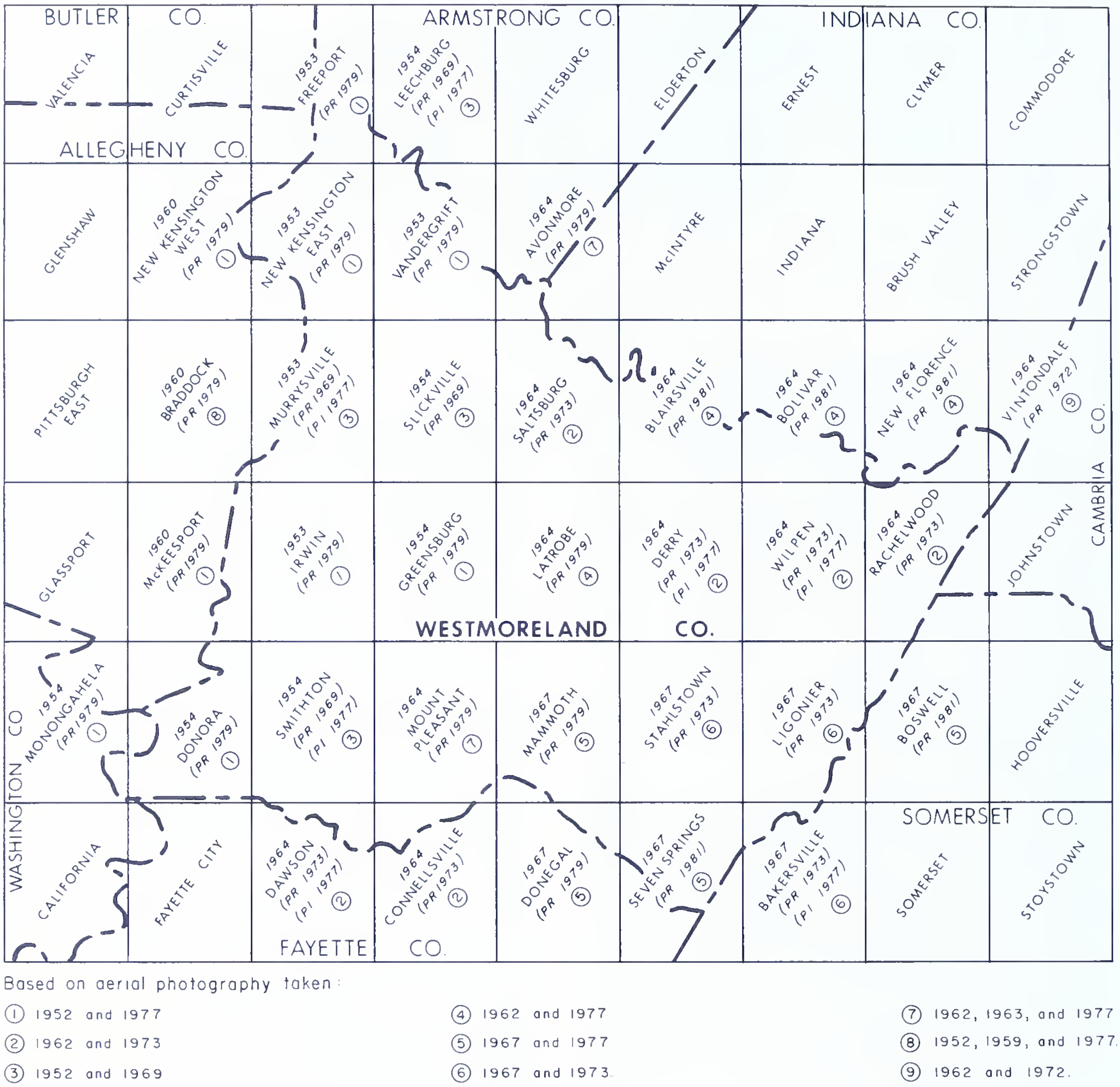
BUTLER CO.
ARMSTRONG CO.
INDIANA CO.
VALENCIA
CURTISVILLE
1953 FREEPORT (PR 1979) ①
1954 LEECHBURG (PR 1969) (PI 1977) ③
WHITESBURG
ELDERTON
ERNEST
CLYMER
COMMODORE
ALLEGHENY CO.
GLENSHAW
1960 NEW KENSINGTON WEST (PR 1979) ①
1953 NEW KENSINGTON EAST (PR 1979) ①
1953 VANDERGRIFT (PR 1979) ①
1964 AVONMORE (PR 1979) ⑦
McINTYRE
INDIANA
BRUSH VALLEY
STRONGSTOWN
PITTSBURGH EAST
1960 BRADDOCK (PR 1979) ⑧
1953 MURRYSVILLE (PR 1969) (PI 1977) ③
1954 SLICKVILLE (PR 1969) ③
1964 SALTSBURG (PR 1973) ②
1964 BLAIRSVILLE (PR 1981) ④
1964 BOLIVAR (PR 1981) ④
1964 NEW FLORENCE (PR 1981) ④
1964 VINTONDALE (PR 1972) ⑨
CAMBRIA CO.
GLASSPORT
1960 McKEESPORT (PR 1979) ①
1953 IRWIN (PR 1979) ①
1954 GREENSBURG (PR 1979) ①
1964 LATROBE (PR 1979) ④
1964 DERRY (PR 1973) (PI 1977) ②
1964 WILPEN (PR 1973) (PI 1977) ②
1964 RACHELWOOD (PR 1973) ②
JOHNSTOWN
WESTMORELAND CO.
WASHINGTON CO.
1954 MONONGAHELA (PR 1979) ①
1954 DONORA (PR 1979) ①
1954 SMITHTON (PR 1969) (PI 1977) ③
1964 MOUNT PLEASANT (PR 1979) ⑦
1967 MAMMOTH (PR 1979) ⑤
1967 STAHLSTOWN (PR 1973) ⑥
1967 LIGONIER (PR 1973) ⑥
1967 BOSWELL (PR 1981) ⑤
HOOVERSVILLE
CALIFORNIA
FAYETTE CITY
1964 DAWSON (PR 1973) (PI 1977) ②
1964 CONNELLSVILLE (PR 1973) ②
1967 DONEGAL (PR 1979) ⑤
1967 SEVEN SPRINGS (PR 1981) ⑤
1967 BAKERSVILLE (PR 1973) (PI 1977) ⑥
SOMERSET CO.
SOMERSET
STOYSTOWN
FAYETTE CO.
Based on aerial photography taken:
① 1952 and 1977
② 1962 and 1973
③ 1952 and 1969
④ 1962 and 1977
⑤ 1967 and 1977
⑥ 1967 and 1973
⑦ 1962, 1963, and 1977
⑧ 1952, 1959, and 1977
⑨ 1962 and 1972

Figure 1. Index map of 7½-minute quadrangles in Westmoreland County. Dates of publication of topographic quadrangle maps are shown in italic type. Dates of photorevision (PR) and photoinspection (PI) are shown in parentheses.

of fold axes. The general layout of the compilation maps is shown in Figure 3.

Where openings of abandoned deep mines were recognized but the areal shapes of the mines are not known, the openings of the mines are shown on the maps. In quadrangles where there is an individual map of the coal seam containing an abandoned deep mine of unknown areal extent, the opening of the abandoned deep mine is shown on that map. If there is not an individual map for the coal seam, then any openings to abandoned mines are shown on the composite map.

The map reliability values given in this report are meant to be used as a general guide. The reliability values for coal crop lines and structure contour lines are defined according to the approximate accuracy of the vertical placement of these lines: very good, ±10 feet; good, ±20 feet; fair, ±50 feet; and poor, ±>50 feet. Generally, in Westmoreland County, map reliability is good to very good in the mined

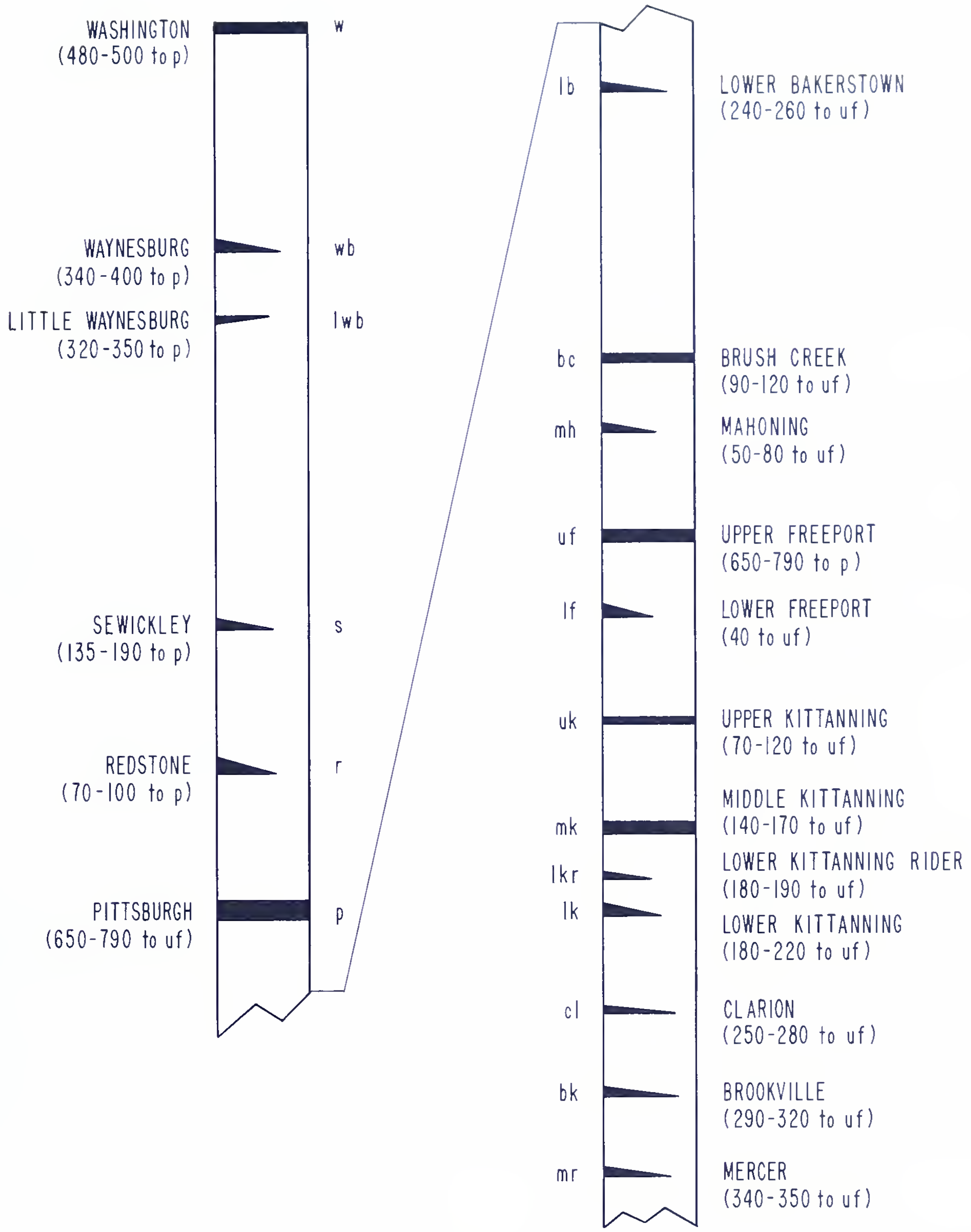

Figure 2. Stratigraphic position of the principal coal seams in Westmoreland County. The intervals, in feet, to either the Pittsburgh (p) or Upper Freeport (uf) coal are given in parentheses. Thicknesses of the coal seams are not to scale.

areas. This includes the southwestern corner of the county and all of the synclinal areas underlain by the extensively mined Pittsburgh coal, the northwestern part of the county and an area along the Fayette anticline where the Upper Freeport coal has been mined, and the parts of Chestnut Ridge where exploration and strip mining of the Middle Kittanning coal have taken place. In contrast to this, map reliability is considered to be only fair to poor along the western slope of Laurel Hill and in large parts of the Ligonier Valley where very little exploration and mining have occurred.

In a few areas along the county border, there are minor offsets of structure contours and crop lines

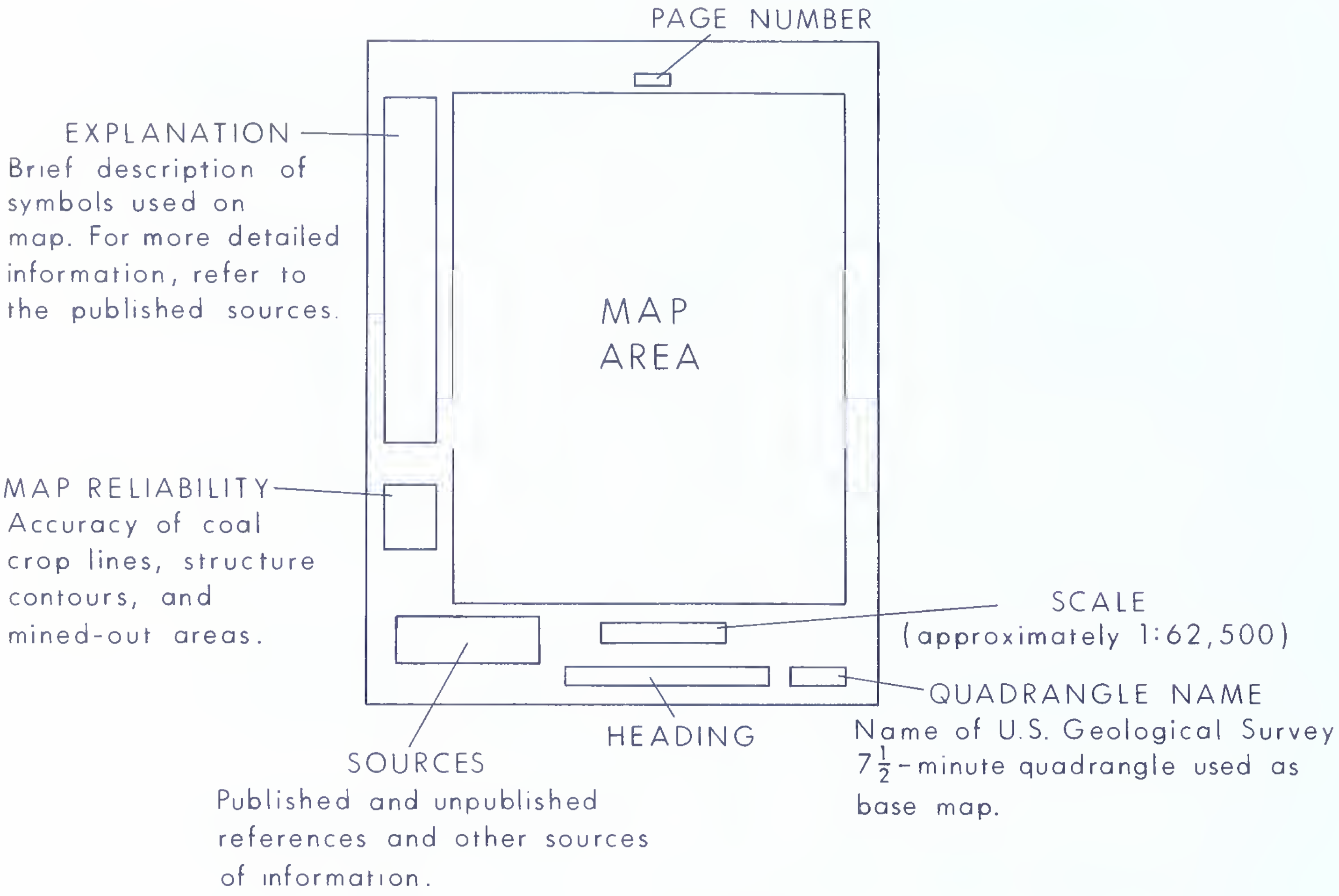
PAGE NUMBER
EXPLANATION
Brief description of symbols used on map. For more detailed information, refer to the published sources.
MAP AREA
MAP RELIABILITY
Accuracy of coal crop lines, structure contours, and mined-out areas.
SCALE
(approximately 1:62,500)
QUADRANGLE NAME
Name of U.S. Geological Survey 7½-minute quadrangle used as base map.
HEADING
SOURCES
Published and unpublished references and other sources of information.

Figure 3. Guide to layout of compilation maps.

from those of the adjoining counties. This is because some information in this report was not available at the time the previously published reports were being compiled.

The reader is advised that all of the original compilation maps are available for public inspection at the offices of the Pennsylvania Geological Survey in Harrisburg. The scale of the original maps is 1:24,000.

The following list of references can be used to locate further information on the geology of Westmoreland County and the quality of coal in the county.

REFERENCES

Berg, T. M., and Dodge, C. M., compilers and editors (1981), *Atlas of preliminary geologic quadrangle maps of Pennsylvania,* Pennsylvania Geological Survey, 4th ser., Map 61, 636 p.

Birge, G. W., and Wolfson, D. E. (1957), *Carbonizing properties of Westmoreland County, Pa., coals,* U.S. Bureau of Mines Report of Investigations 5374, 12 p.

Bragonier, W. A., Glover, A. D., and Phillips, J. G., compilers (in preparation), *Coal resources of Indiana County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours,* Pennsylvania Geological Survey, 4th ser., Mineral Resource Report.

Bushnell, K. O. (1975), *Map showing depths to the Pittsburgh coal bed, mining activity, and related surface subsidence, Allegheny, Washington, and Westmoreland Counties, Pennsylvania,* U.S. Geological Survey Miscellaneous Field Studies Map MF-693-A, scale 1:125,000.

Bushnell, K. O., and Peak, J. R. (1975), *Map showing depths to the Upper Freeport coal bed, mining activity, and related surface subsidence, and the Redstone coal bed mines, Allegheny, Washington, and Westmoreland Counties, Pennsylvania,* U.S. Geological Survey Miscellaneous Field Studies Map MF-693-B, scale 1:125,000.

Campbell, M. R. (1903), *Brownsville-Connellsville folio, Pennsylvania,* U.S. Geological Survey Geologic Atlas of the U.S., Folio 94, 19 p.

________ (1904), *Latrobe folio, Pennsylvania,* U.S. Geological Survey Geologic Atlas of the U.S., Folio 110, 15 p.

Cortis, S. E., Alexander, T. B., Edmunds, W. E., and Craft, J. L. (1975), *Greater Pittsburgh Region maps of mined-out areas and thickness of rock over the Pittsburgh coal,* Pennsylvania Geological Survey, 4th ser., Map 45, scale 1:125,000, 2 sheets.

Craft, J. L., Heyman, L., and Piotrowski, R. G. (1976), *Greater Pittsburgh Region thickness of rock over the Upper Freeport* *coal,* Pennsylvania Geological Survey, 4th ser., Map 49, scale 1:125,000.

Crentz, W. L., Bailey, A. L., and Miller, J. W. (1951), *Preparation characteristics of coal occurring in Westmoreland County, Pa.,* U.S. Bureau of Mines Report of Investigations 4823, 17 p.

Dodge, C. H., compiler (1985), *Coal resources of Allegheny County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours,* Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 89, Pt. 1, 68 p.

Dowd, J. J., Turnbull, L. A., Toenges, A. L., and others (1951), *Estimate of known recoverable reserves of coking coal in Westmoreland County, Pa.,* U.S. Bureau of Mines Report of Investigations 4803, 16 p.

Edmunds, W. E. (1972), *Coal reserves of Pennsylvania: total, recoverable, and strippable (January 1, 1970),* Pennsylvania Geological Survey, 4th ser., Information Circular 72, 40 p.

Hughes, H. H. (1933), *Freeport quadrangle—Geology and mineral resources,* Pennsylvania Geological Survey, 4th ser., Atlas 36, 272 p.

Johnson, M. E. (1925), *Mineral resources of the Greensburg quadrangle, Westmoreland County, Pennsylvania,* Pennsylvania Geological Survey, 4th ser., Atlas 37, 162 p.

________ (1929), *Pittsburgh quadrangle—Geology and mineral resources,* Pennsylvania Geological Survey, 4th ser., Atlas 27, 236 p.

Koppe, E. F. (1963), *Petrography of the Upper Freeport coal—Harmar and Springdale mines, Allegheny and Westmoreland Counties, Pennsylvania,* Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 48, 43 p.

Puglio, D. G., and Iannacchione, A. T. (1979), *Geology, mining, and methane content of the Freeport and Kittanning coalbeds in Indiana and surrounding counties, Pa.,* U.S. Bureau of Mines Report of Investigations 8406, 35 p.

Richardson, G. B. (1932), *Geology and coal, oil, and gas resources of the New Kensington quadrangle, Pennsylvania,* U.S. Geological Survey Bulletin 829, 102 p.

________ (1934), *Somerset-Windber folio, Pennsylvania,* U.S. Geological Survey Geologic Atlas of the U.S., Folio 224, 14 p.

Roen, J. B., Kent, B. H., and Schweinfurth, S. P. (1968), *Geologic map of the Monongahela quadrangle, southwestern Pennsylvania,* U.S. Geological Survey Geologic Quadrangle Map GQ-743, scale 1:24,000.

Shaffner, M. N. (1958), *Geology and mineral resources of the New Florence quadrangle, Pennsylvania,* Pennsylvania Geological Survey, 4th ser., Atlas 57, 165 p.

________ (1963), *Geology and mineral resources of the Donegal quadrangle, Pennsylvania,* Pennsylvania Geological Survey, 4th ser., Atlas 48, 116 p.

Shaulis, J. R., compiler (1985), *Coal resources of Fayette County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours,* Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 91, Pt. 1, 88 p.

Sholes, M. A., and Skema, V. W., compilers (1974), *Bituminous coal resources in western Pennsylvania,* Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 68, scale 1:250,000, 13 pls.

Sholes, M. A., Edmunds, W. E., and Skema, V. W. (1979), *The economic geology of the Upper Freeport coal in the New Stanton area of Westmoreland County, Pennsylvania: a model for coal exploration,* Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 75, 51 p.

Sisler, J. D. (1926), *Bituminous coal fields of Pennsylvania—Part II, Detailed description of coal fields,* Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 6, Pt. 2, 511 p.

Skema, V. W., Berg, T. M., Bragonier, W. A., and others (1975), *Analyses and measured sections of Pennsylvania bituminous coals, Part II,* Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 69, 306 p.

Skema, V. W., Edmunds, W. E., Glover, A. D., and others (1977), *Analyses and measured sections of Pennsylvania bituminous coals, Part III,* Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 74, 272 p.

Sponseller, R. D. (1973), *Analyses and measured sections of Pennsylvania bituminous coals,* Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 66, [479 p.].

Stone, R. W. (1905), *Elders Ridge folio, Pennsylvania,* U.S. Geological Survey Geologic Atlas of the U.S., Folio 123, 10 p.

Wagner, W. R., Craft, J. L., Heyman, L., and Harper, J. A. (1975), *Greater Pittsburgh Region geologic map and cross sections,* Pennsylvania Geological Survey, 4th ser., Map 42, scale 1:125,000, 6 pls.

Wagner, W. R., Heyman, L., Craft, J. L., and others (1975), *Greater Pittsburgh Region structure contour map,* Pennsylvania Geological Survey, 4th ser., Map 43, scale 1:125,000.

UNITED STATES
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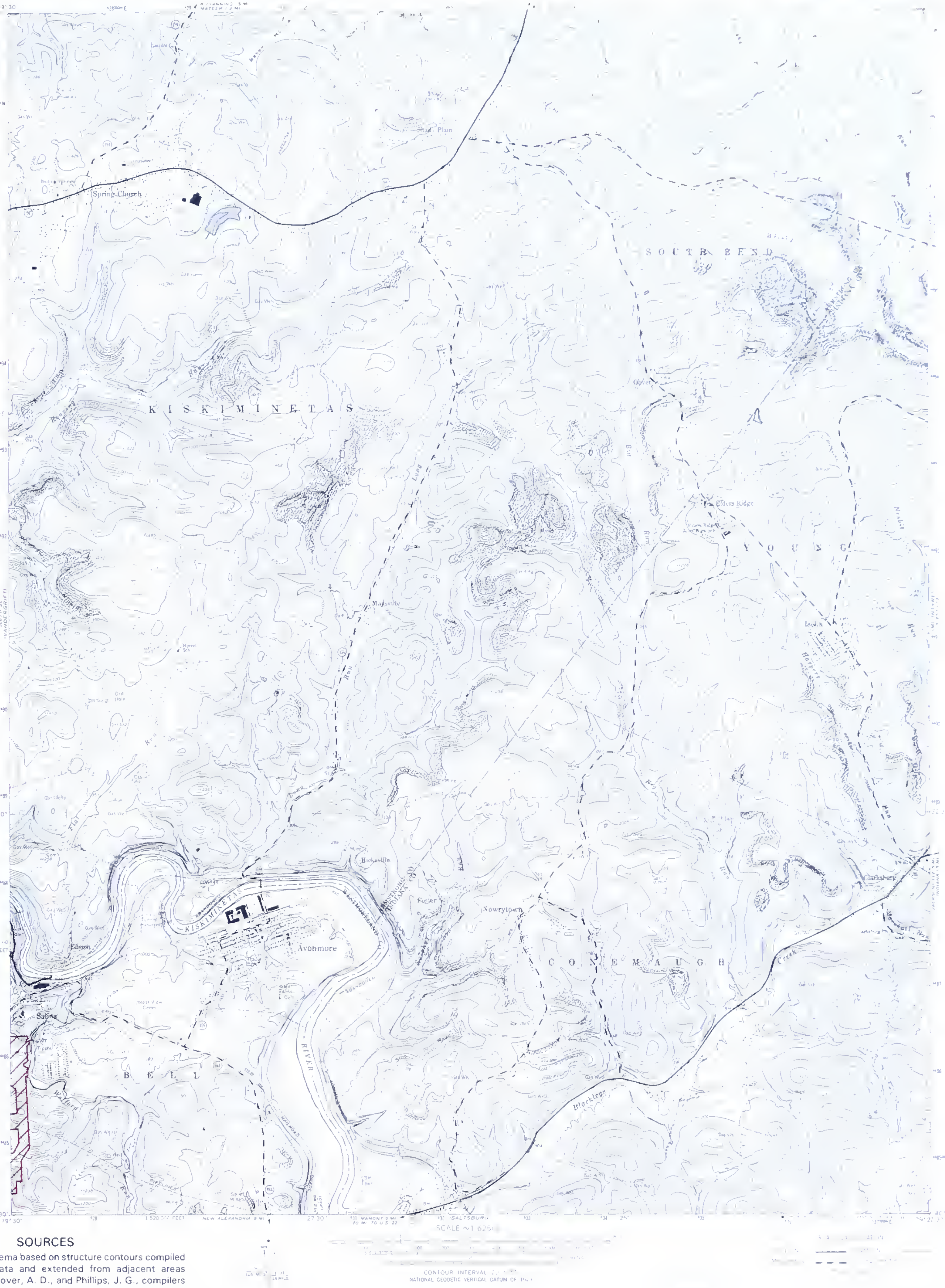
GEOLOGICAL SURVEY

EXPLANATION

〰 Crop line of the Upper Freeport coal

▨ Extent of known deep mining



MAP RELIABILITY

Coal crop line—very good
Limits of known deep mining—approximate

SOURCES

Crop line by V. W. Skema based on structure contours compiled from unpublished data and extended from adjacent areas (Bragonier, W. A., Glover, A. D., and Phillips, J. G., compilers (in preparation), *Coal resources of Indiana County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report; and Bragonier, W. A. (1986), unpublished map for Avonmore quadrangle, Armstrong County).
Limits of deep mining from unpublished mine maps.

AVONMORE

CROP LINE AND MINED-OUT AREAS OF THE UPPER FREEPORT COAL

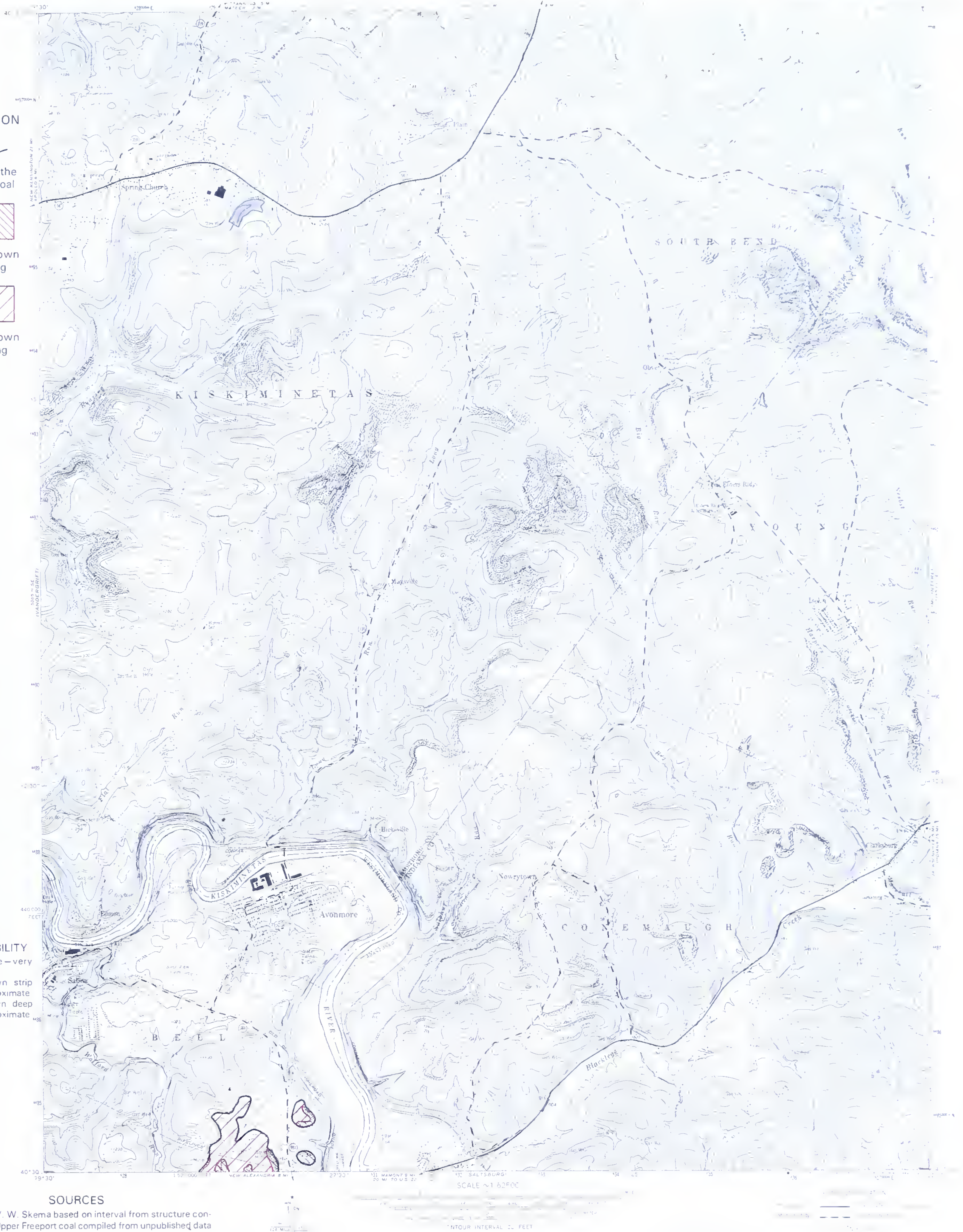
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

〰 Crop line of the Pittsburgh coal

▨ Extent of known strip mining

▨ Extent of known deep mining



MAP RELIABILITY

Coal crop line—very good
Limits of known strip mining—approximate
Limits of known deep mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Upper Freeport coal compiled from unpublished data and extended from adjacent areas (Bragonier, W. A., Glover, A. D., and Phillips, J. G., compilers (in preparation), *Coal resources of Indiana County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*. Pennsylvania Geological Survey, 4th ser., Mineral Resource Report, and Bragonier, W. A. (1986), unpublished map for Avonmore quadrangle, Armstrong County), and also based on locations of strip mines on topographic map.

Limits of strip mining based on interpretation of topographic map and aerial photographs

Limits of deep mining from unpublished mine maps.

CROP LINE AND MINED-OUT AREAS OF THE
PITTSBURGH COAL

AVONMORE

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

CROP LINES

p — Pittsburgh coal

bc — Brush Creek coal

mh — Mahoning coal

uf — Upper Freeport coal

uk — Upper Kittanning coal

mk — Middle Kittanning coal

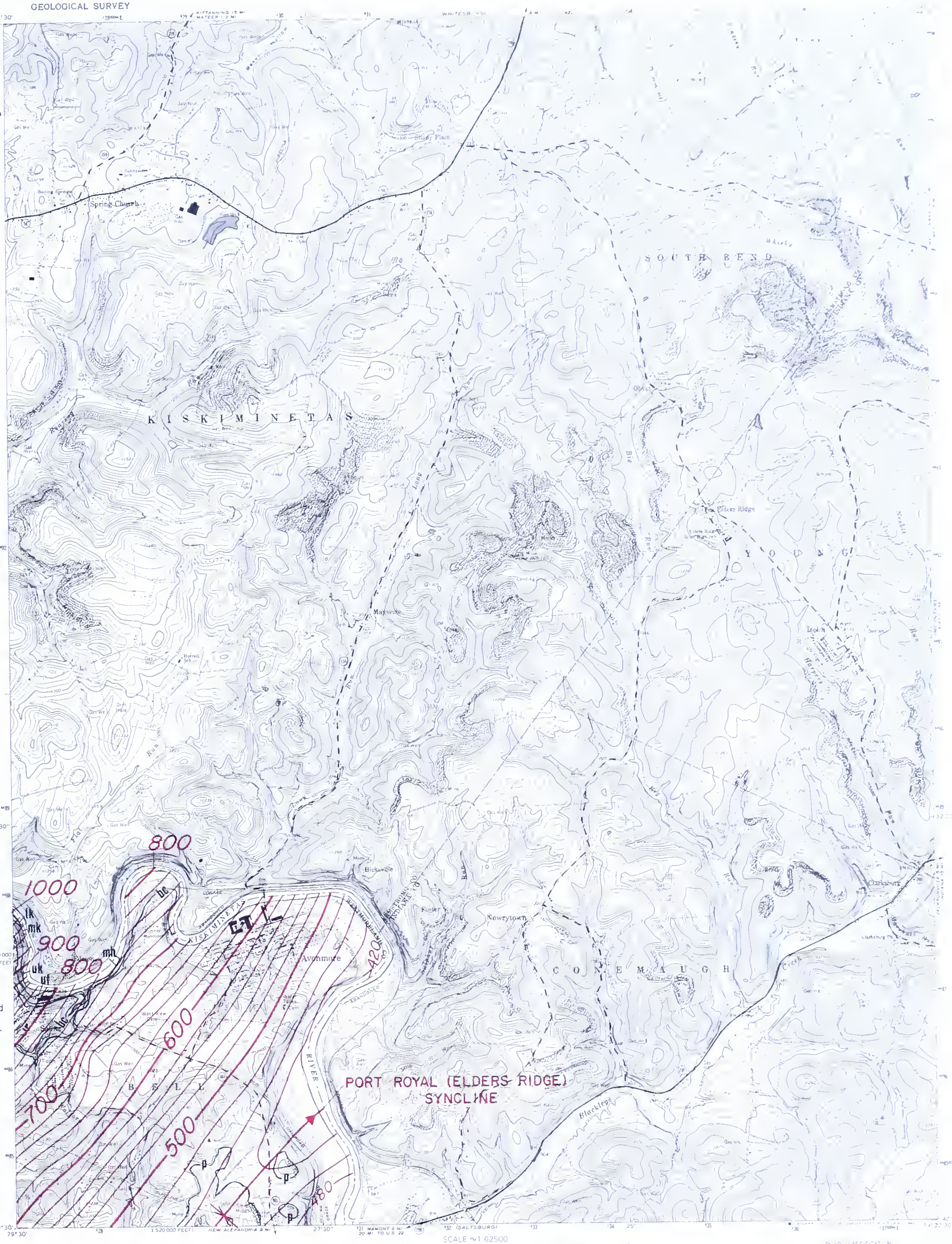
lk — Lower Kittanning coal

Syncline
Showing axial-plane trace and direction of plunge.

600 — Structure contour
Altitude of the base of the Upper Freeport coal, in feet above mean sea level. Contour interval 20 feet

MAP RELIABILITY

Coal crop lines — good to very good
Structure contours — good to very good



SCALE ~1 62500

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

UTM GRID AND 1979 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

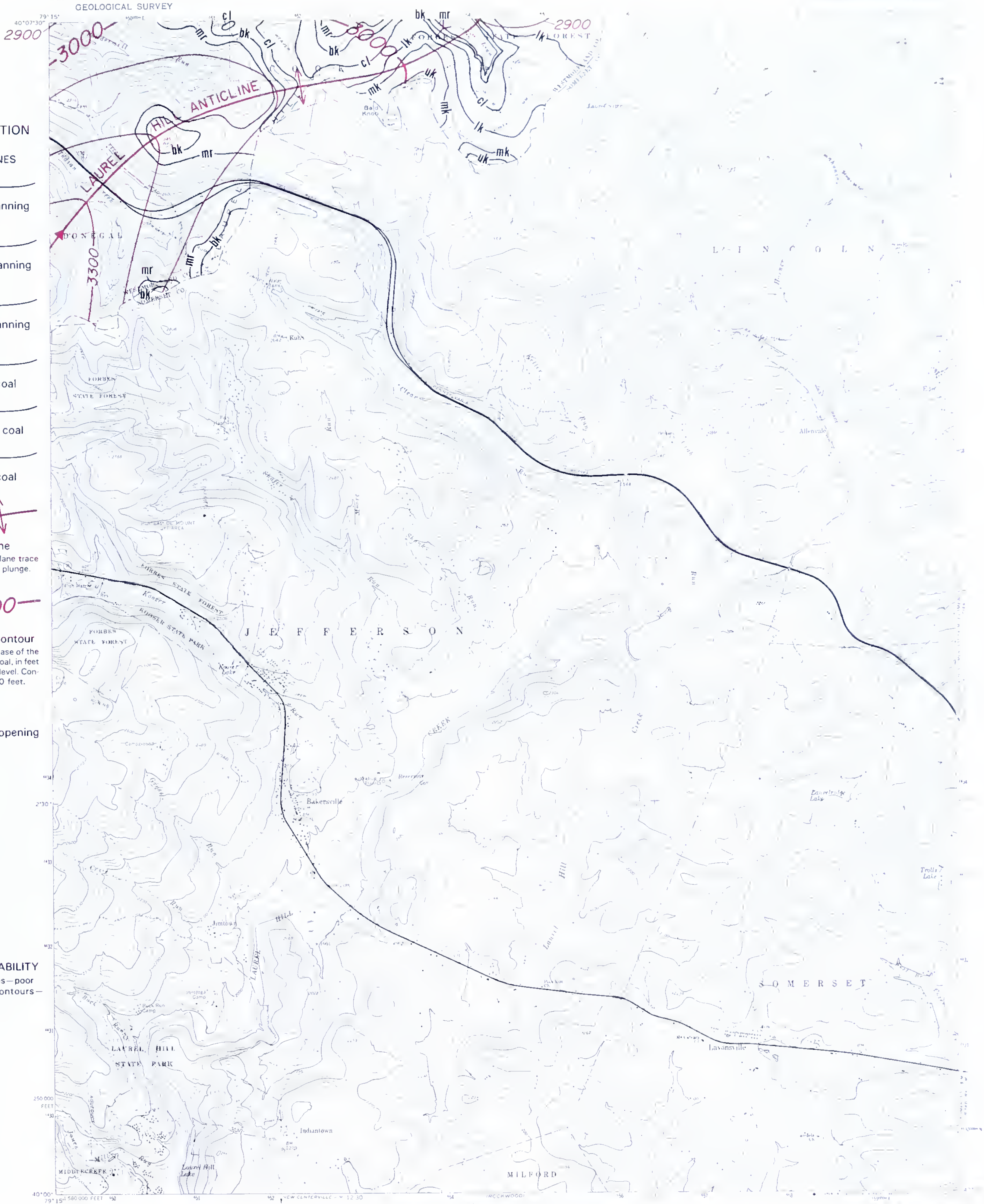
SOURCES

Crop lines by V. W. Skema based on structure contours and intervals from structure contours.
Structure contours compiled by V. W. Skema from unpublished data and contours extended from adjacent areas (Bragonier, W. A., Glover, A. D., and Phillips, J. G., compilers (in preparation), *Coal resources of Indiana County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report; and Bragonier, W. A. (1986), unpublished map for Avonmore quadrangle, Armstrong County).

AVONMORE

COAL CROP LINES AND STRUCTURE CONTOURS

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



EXPLANATION

CROP LINES

uk
Upper Kittanning coal

mk
Middle Kittanning coal

lk
Lower Kittanning coal

cl
Clarion coal

bk
Brookville coal

mr
Mercer coal

Anticline
Showing axial-plane trace and direction of plunge.

3000
Structure contour
Altitude of the base of the Upper Freeport coal, in feet above mean sea level. Contour interval 100 feet.

Deep-mine opening

MAP RELIABILITY
Coal crop lines—poor
Structure contours—poor

SOURCES

Crop lines and structure contours by V. W. Skema based on unpublished data and minor reference to Richardson, G. B. (1934), *Somerset-Windber folio, Pennsylvania*, U.S. Geological Survey Geologic Atlas of the U.S., Folio 224, 14 p. Location of deep-mine opening from unpublished data

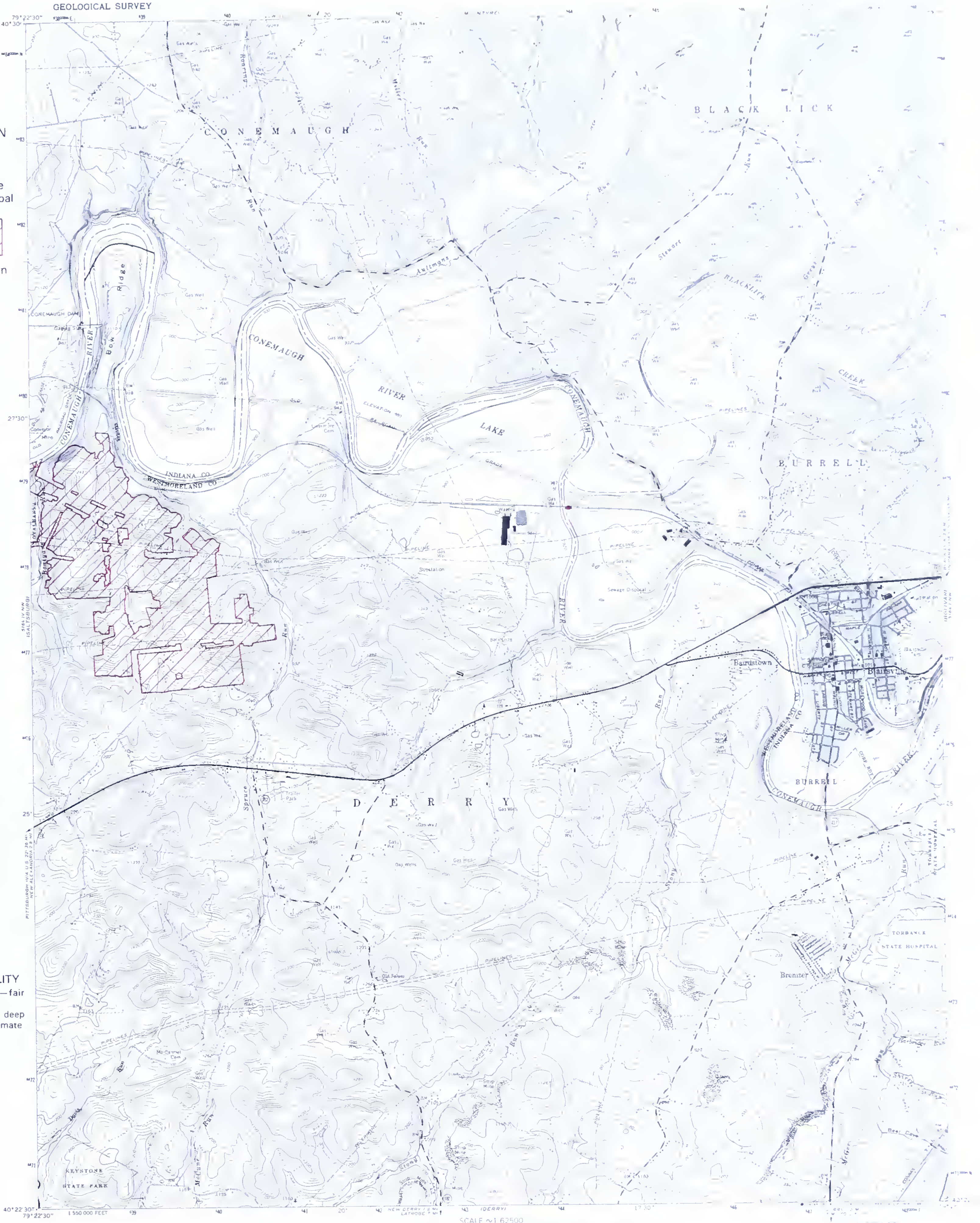
BAKERSVILLE

COAL CROP LINES AND STRUCTURE CONTOURS

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

〜	Crop line of the Upper Freeport coal
▨	Extent of known deep mining



MAP RELIABILITY
Coal crop line—fair to good
Limits of known deep mining—approximate

SOURCES

Crop line by V. W. Skema based on structure contours compiled from unpublished data and extended from adjacent area (Bragonier, W. A., Glover, A. D., and Phillips, J. G., compilers (in preparation), *Coal resources of Indiana County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report).

Limits of deep mining from Bragonier, W. A., Glover, A. D., and Phillips, J. G., compilers (in preparation).

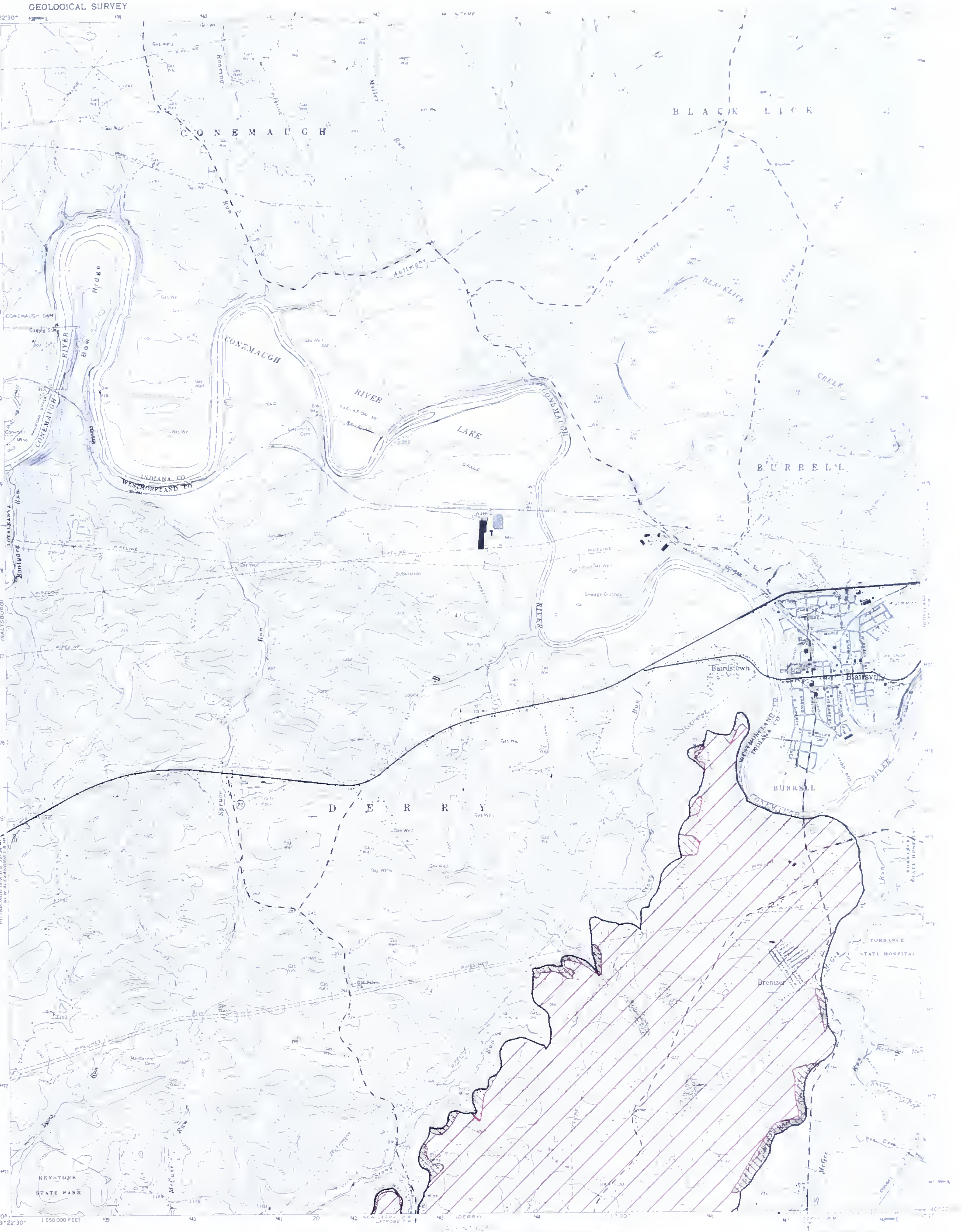
CROP LINE AND MINED-OUT AREA OF THE
UPPER FREEPORT COAL

BLAIRSVILLE

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

〰	Crop line of the Pittsburgh coal
▧	Extent of known strip mining
▨	Extent of known deep mining



CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

MAP RELIABILITY

Coal crop line—good
Limits of known strip mining—approximate
Limits of known deep mining—approximate

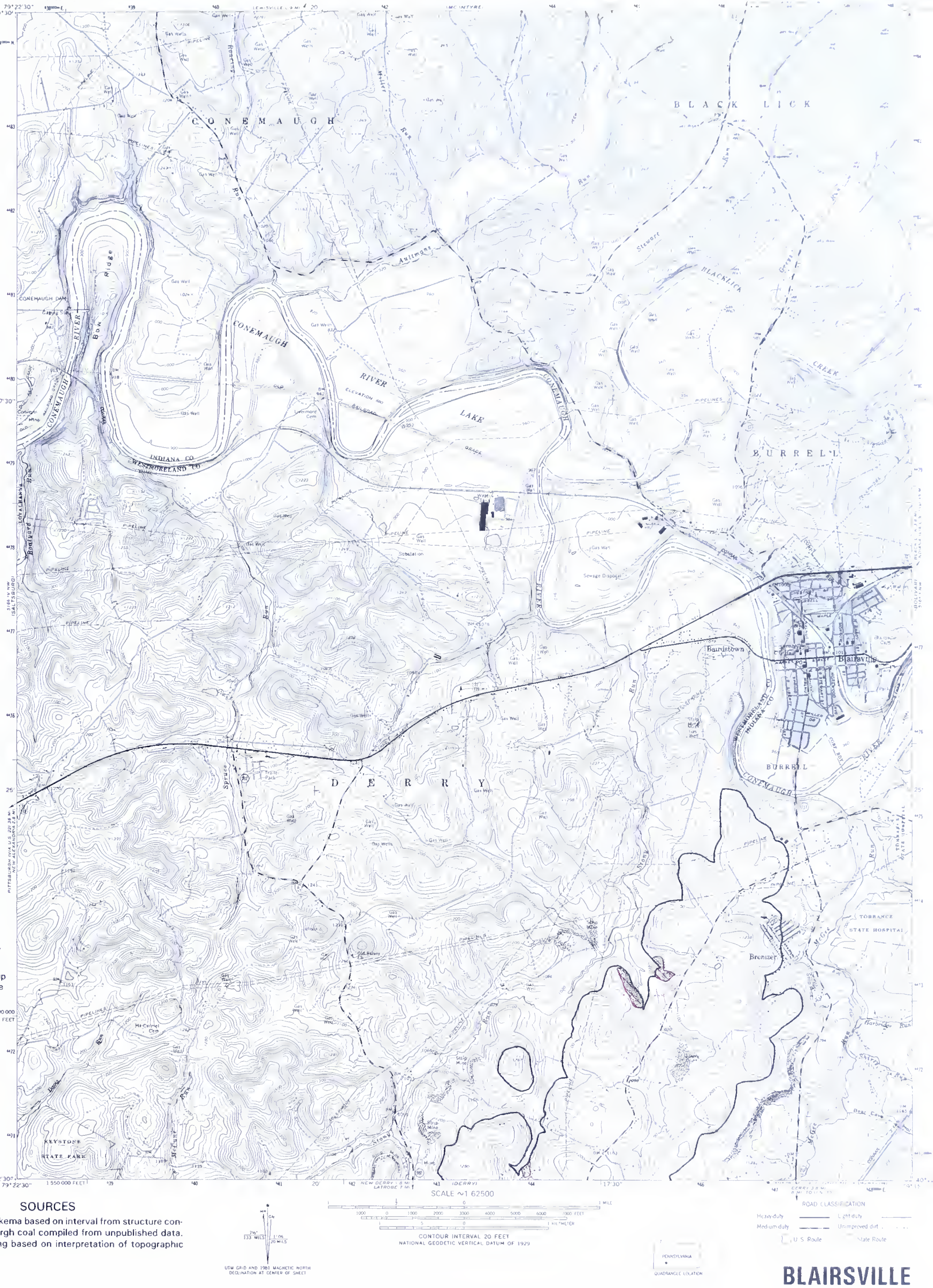
SOURCES

Crop line by V. W. Skema based on structure contours compiled from unpublished data.
Limits of strip mining based on interpretation of topographic map and aerial photographs.
Limits of deep mining from unpublished mine maps.

BLAIRSVILLE

CROP LINE AND MINED-OUT AREAS OF THE PITTSBURGH COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



EXPLANATION

~ Crop line of the Sewickley coal

▨ Extent of known strip mining

MAP RELIABILITY
Coal crop line—good
Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Pittsburgh coal compiled from unpublished data. Limits of strip mining based on interpretation of topographic map.

BLAIRSVILLE

CROP LINE AND MINED-OUT AREAS OF THE

SEWICKLEY COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

BLAIRSVILLE QUADRANGLE
PENNSYLVANIA
7.5 MINUTE SERIES (TOPOGRAPHIC)

EXPLANATION

CROP LINES

——— s ——— Sewickley coal

——— r ——— Redstone coal

——— p ——— Pittsburgh coal

——— bc ——— Brush Creek coal

——— mh ——— Mahoning coal

——— uf ——— Upper Freeport coal

Anticline
Showing axial-plane trace and direction of plunge.

Syncline
Showing axial plane trace and direction of plunge.

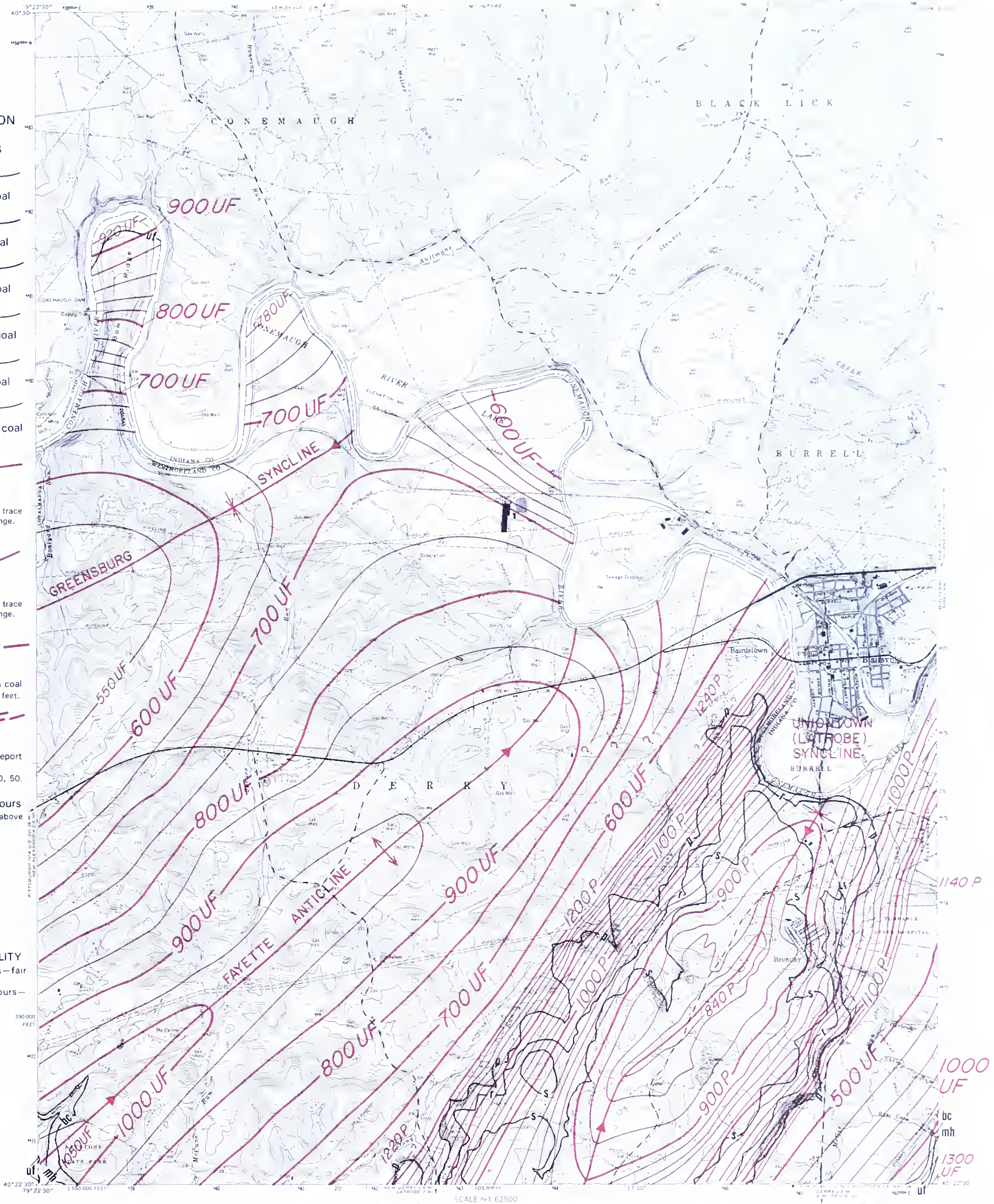
—1000 P—
Base of Pittsburgh coal
Contour interval 20 feet.

—800UF—
Base of Upper Freeport coal
Contour intervals 20, 50, and 100 feet.

Structure contours
Altitudes in feet above mean sea level.

MAP RELIABILITY

Coal crop lines—fair to good
Structure contours—fair to good



SCALE 1:62500
1 ½ 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 .5 0 1 KILOMETER
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

MN GN 7½° 133 MILS 1° 20 MILS
UTM GRID AND 1981 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

PENNSYLVANIA
QUADRANGLE LOCATION

ROAD CLASSIFICATION
Heavy-duty
Light-duty
Medium-duty
Unimproved dirt
U. S. Route
State Route

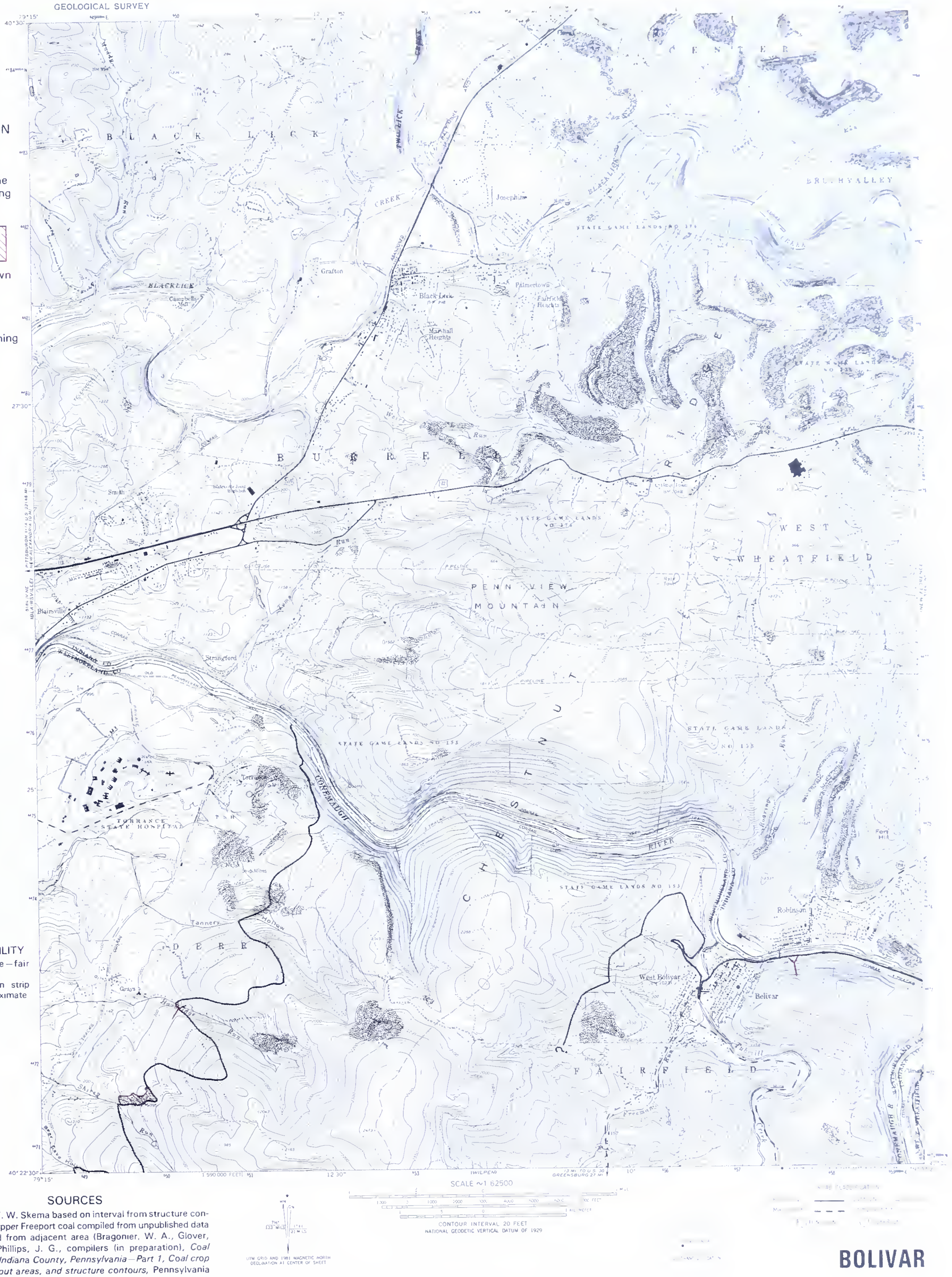
SOURCES

Crop lines by V. W. Skema based on structure contours and intervals from structure contours.
Structure contours compiled by V. W. Skema from unpublished data and contours extended from adjacent area (Bragonier, W. A., Glover, A. D., and Phillips, J. G., compilers (in preparation), *Coal resources of Indiana County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report).

COAL CROP LINES AND STRUCTURE CONTOURS

BLAIRSVILLE

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



EXPLANATION

〰 Crop line of the Lower Kittanning coal

▨ Extent of known strip mining

Y Deep-mine opening

MAP RELIABILITY

Coal crop line—fair to good

Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Upper Freeport coal compiled from unpublished data and extended from adjacent area (Bragonier, W. A., Glover, A. D., and Phillips, J. G., compilers (in preparation), *Coal resources of Indiana County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report), and also based on location of strip mine on topographic map and interpretation of aerial photographs.

Limits of strip mining based on interpretation of topographic map.

Locations of deep-mine openings from Shaffner, M. N. (1958), *Geology and mineral resources of the New Florence quadrangle, Pennsylvania*, Pennsylvania Geological Survey, 4th ser., Atlas 57, 165 p.

BOLIVAR

CROP LINE AND MINED-OUT AREAS OF THE LOWER KITTANNING COAL

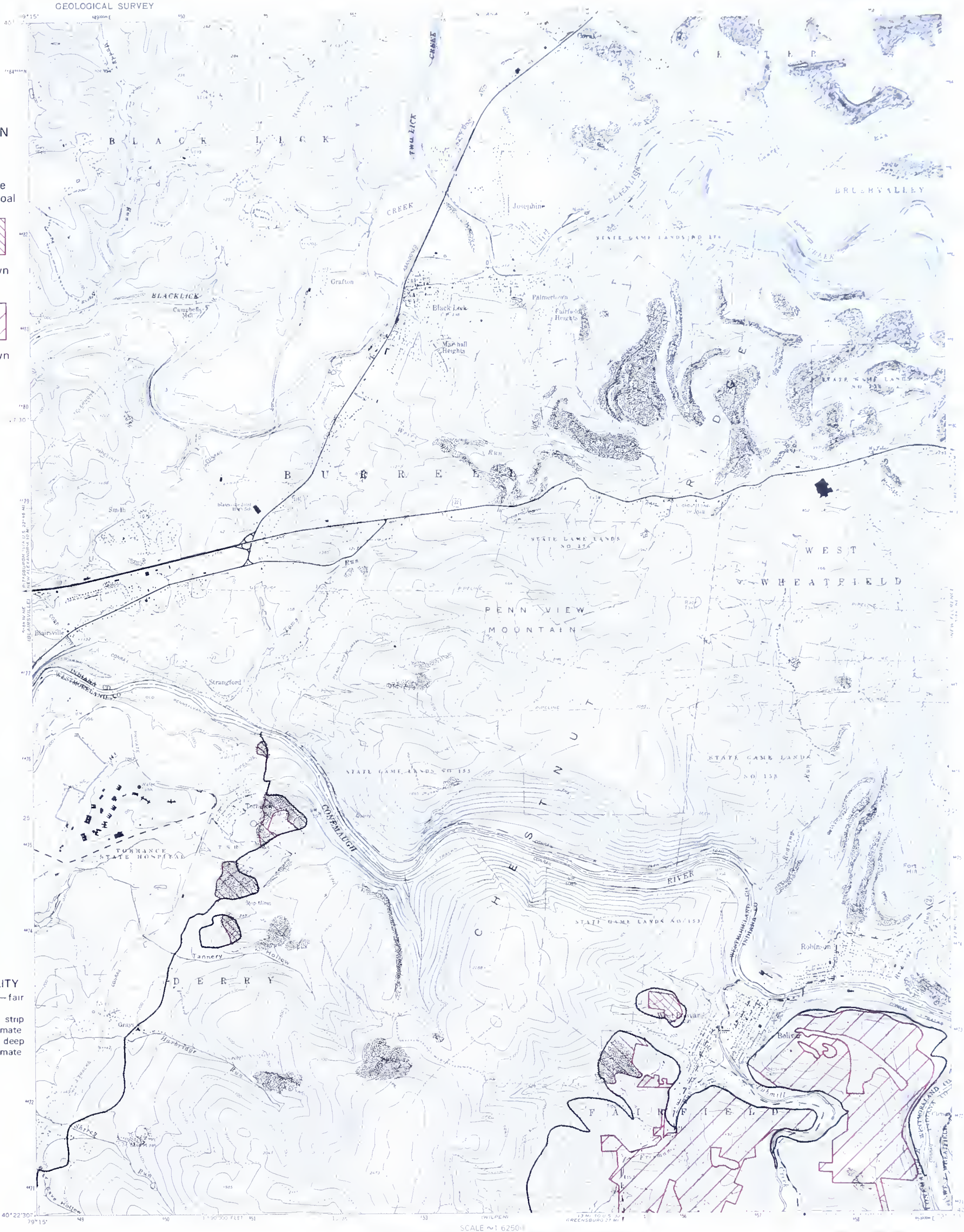
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

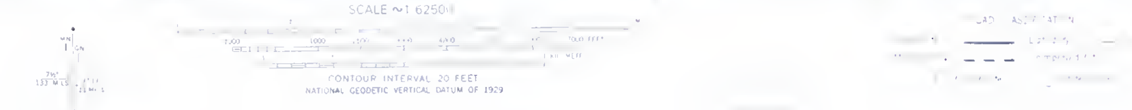
EXPLANATION

〜 Crop line of the Upper Freeport coal

▧ Extent of known strip mining

▨ Extent of known deep mining




SCALE 1:62500
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
UTM GRID AND 1981 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

MAP RELIABILITY

Coal crop line—fair to good
Limits of known strip mining—approximate
Limits of known deep mining—approximate

SOURCES

Crop line by V. W. Skema based on structure contours compiled from unpublished data and extended from adjacent area (Bragonier, W. A., Glover, A. D., and Phillips, J. G., compilers (in preparation), *Coal resources of Indiana County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report).

Limits of strip mining based on interpretation of topographic map and aerial photographs.

Limits of deep mining from unpublished mine maps.

BOLIVAR

CROP LINE AND MINED-OUT AREAS OF THE UPPER FREEPORT COAL

EXPLANATION

CROP LINES

bc — Brush Creek coal

mh — Mahoning coal

uf — Upper Freeport coal

uk — Upper Kittanning coal

mk — Middle Kittanning coal

lk — Lower Kittanning coal

cl — Clarion coal

bk — Brookville coal

mr — Mercer coal

Anticline
Showing axial-plane trace and direction of plunge.

500 — Structure contour
Altitude of the base of the Upper Freeport coal, in feet above mean sea level. Contour intervals 50 and 100 feet.

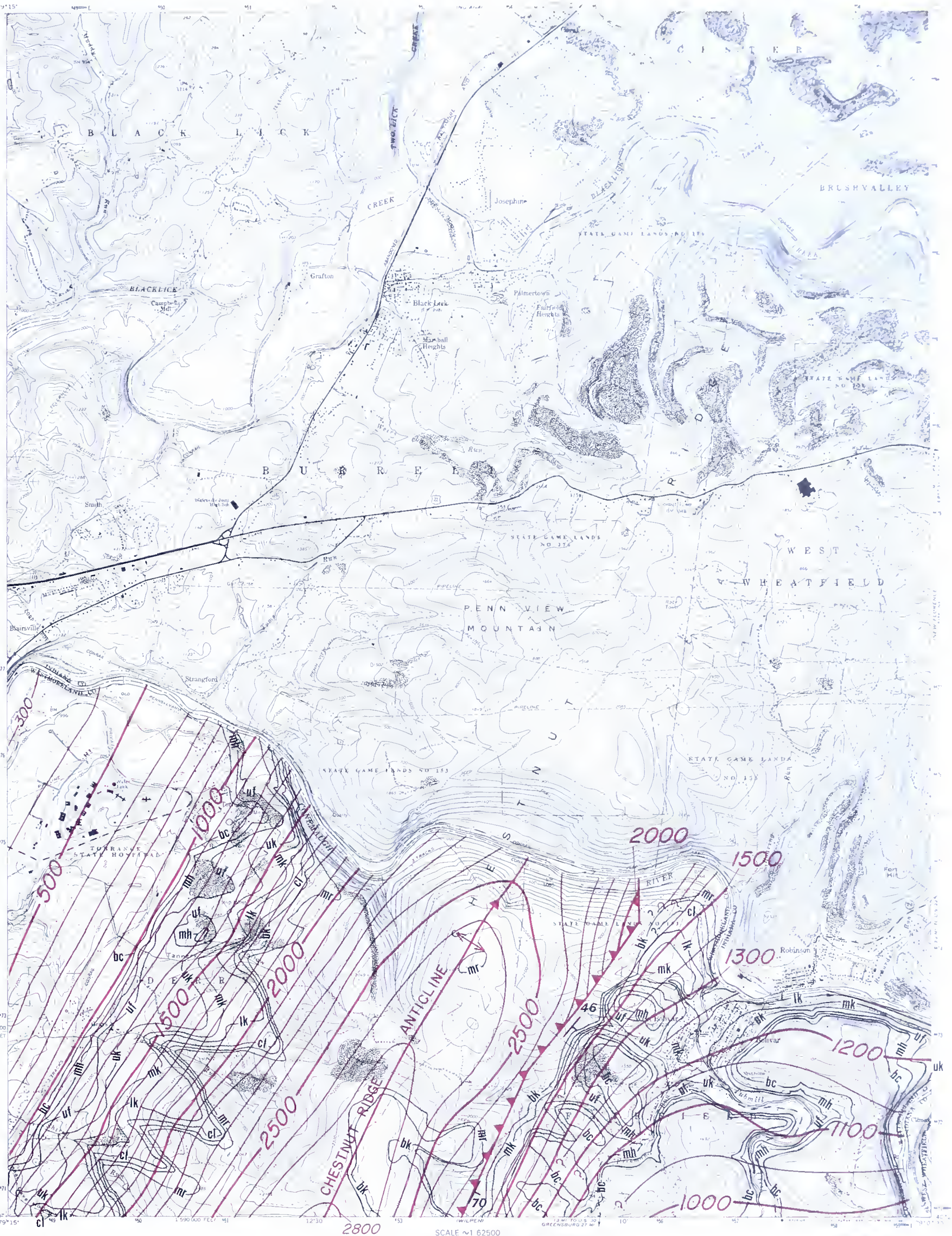
70 — Strike and dip of beds

Reverse fault
High-angle fault. Sawteeth on upper plate.

Note: Because of lack of information and closeness of crop lines, only the stratigraphically important and potentially economic coal horizons are shown along the fault.

MAP RELIABILITY

Coal crop lines—poor to good
Structure contours—poor to good



SCALE 1:62500

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

UTM GRID AND 1961 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SOURCES

Crop lines by V. W. Skema based on structure contours and intervals from structure contours, and interpretation of aerial photographs.

Structure contours compiled by V. W. Skema from unpublished data and contours extended from adjacent area (Bragonier, W. A., Glover, A. D., and Phillips, J. G., compilers (in preparation), *Coal resources of Indiana County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report).

Strike and dip of beds from field measurements and Shaffner, M. N. (1958), *Geology and mineral resources of the New Florence quadrangle, Pennsylvania*, Pennsylvania Geological Survey, 4th ser., Atlas 57, 165 p.

Position of reverse fault modified by V. W. Skema from Berg, T. M., and Dodge, C. M., compilers and editors (1981), *Atlas of preliminary geologic quadrangle maps of Pennsylvania*, Pennsylvania Geological Survey, 4th ser., Map 61, p. 70.

COAL CROP LINES AND STRUCTURE CONTOURS

BOLIVAR

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

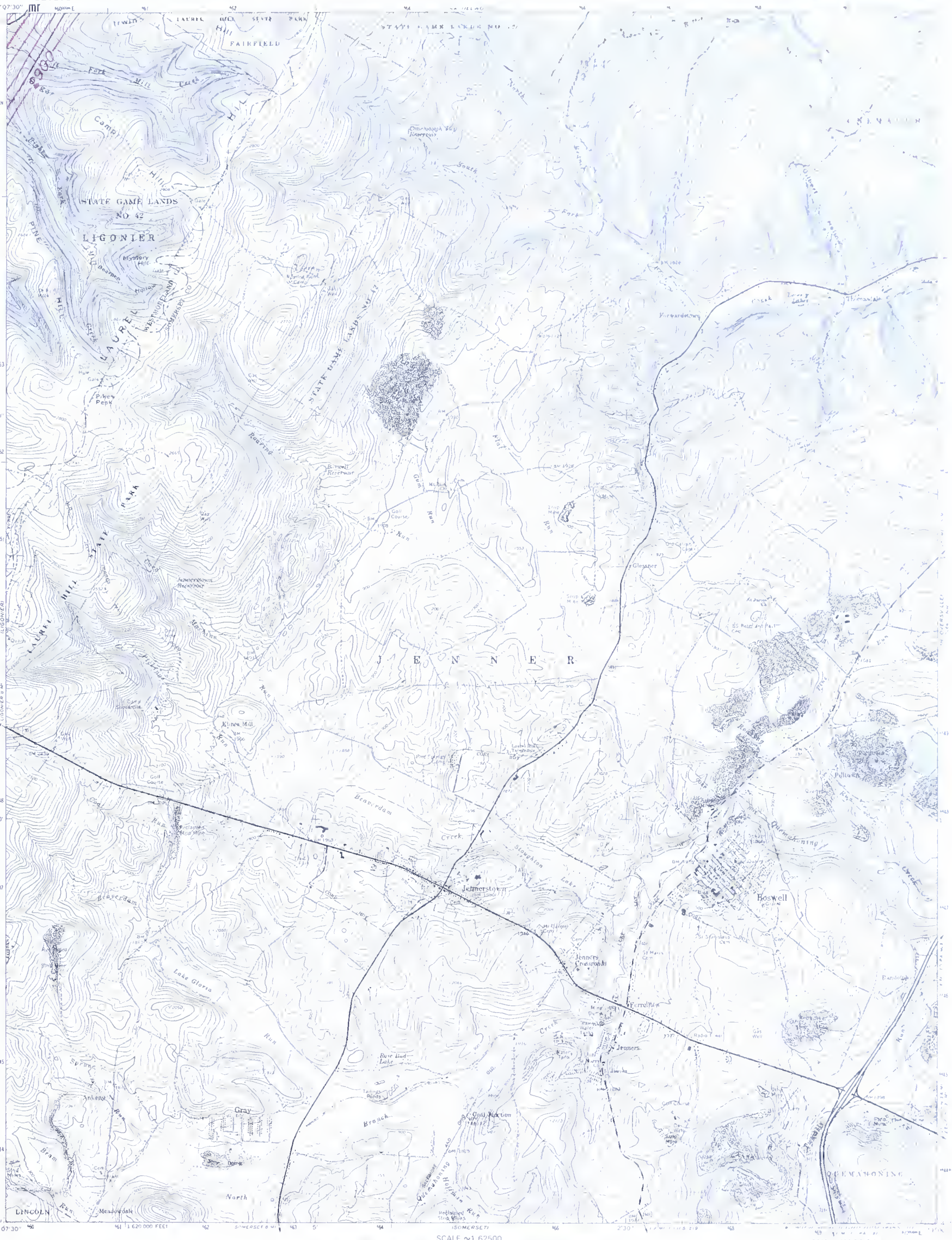
CROP LINE

—— mr ——

Mercer coal

—2500—

Structure contour
Altitude of the base of the Upper Freeport coal, in feet above mean sea level. Contour interval 100 feet.



MAP RELIABILITY

Coal crop line—poor
Structure contours—poor

SOURCE

Crop line and structure contours by V. W. Skema from unpublished data.

BOSWELL

COAL CROP LINE AND STRUCTURE CONTOURS

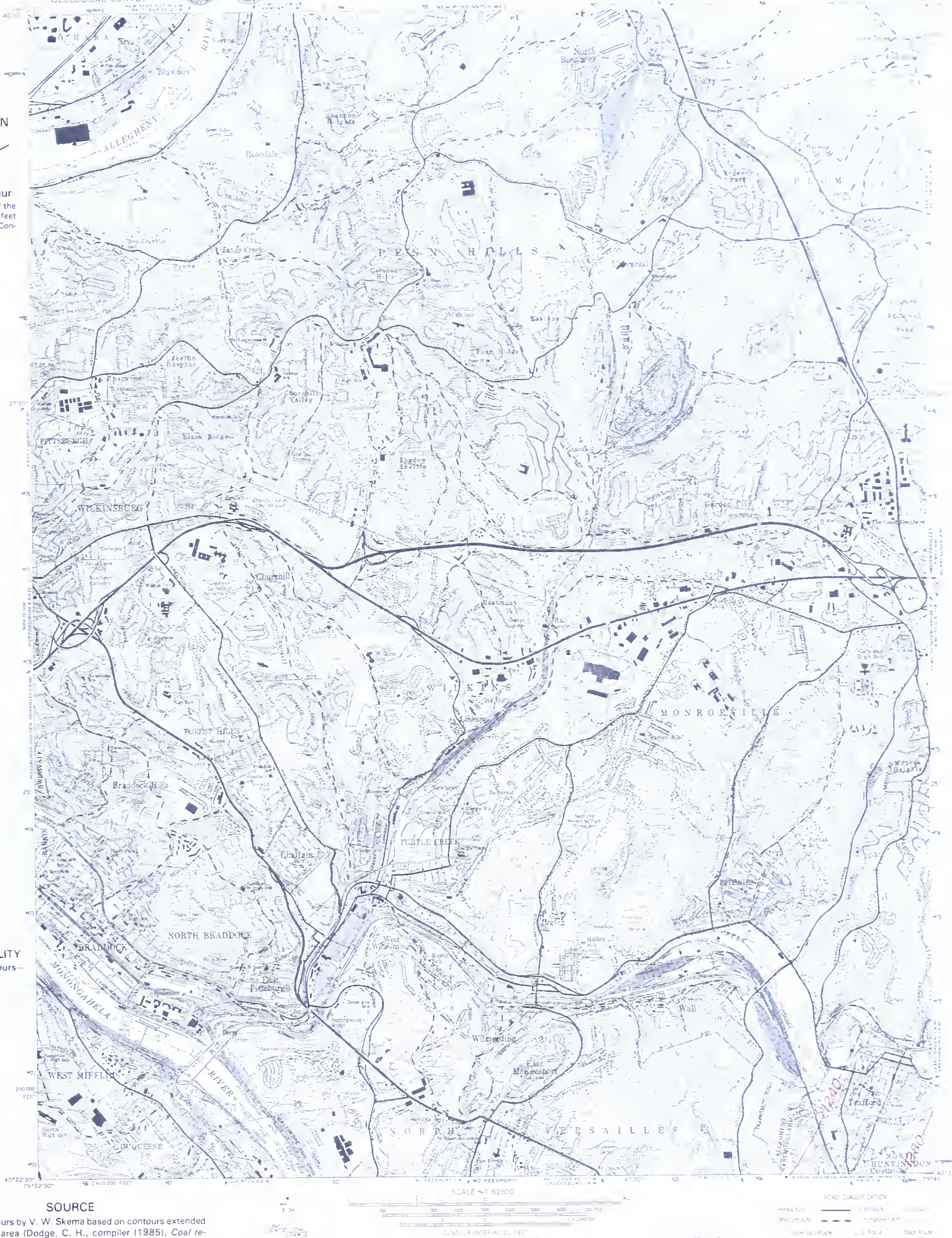
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

1280

Structure contour

Altitude of the base of the Pittsburgh coal, in feet above mean sea level. Contour interval 20 feet.



MAP RELIABILITY

Structure contours—good

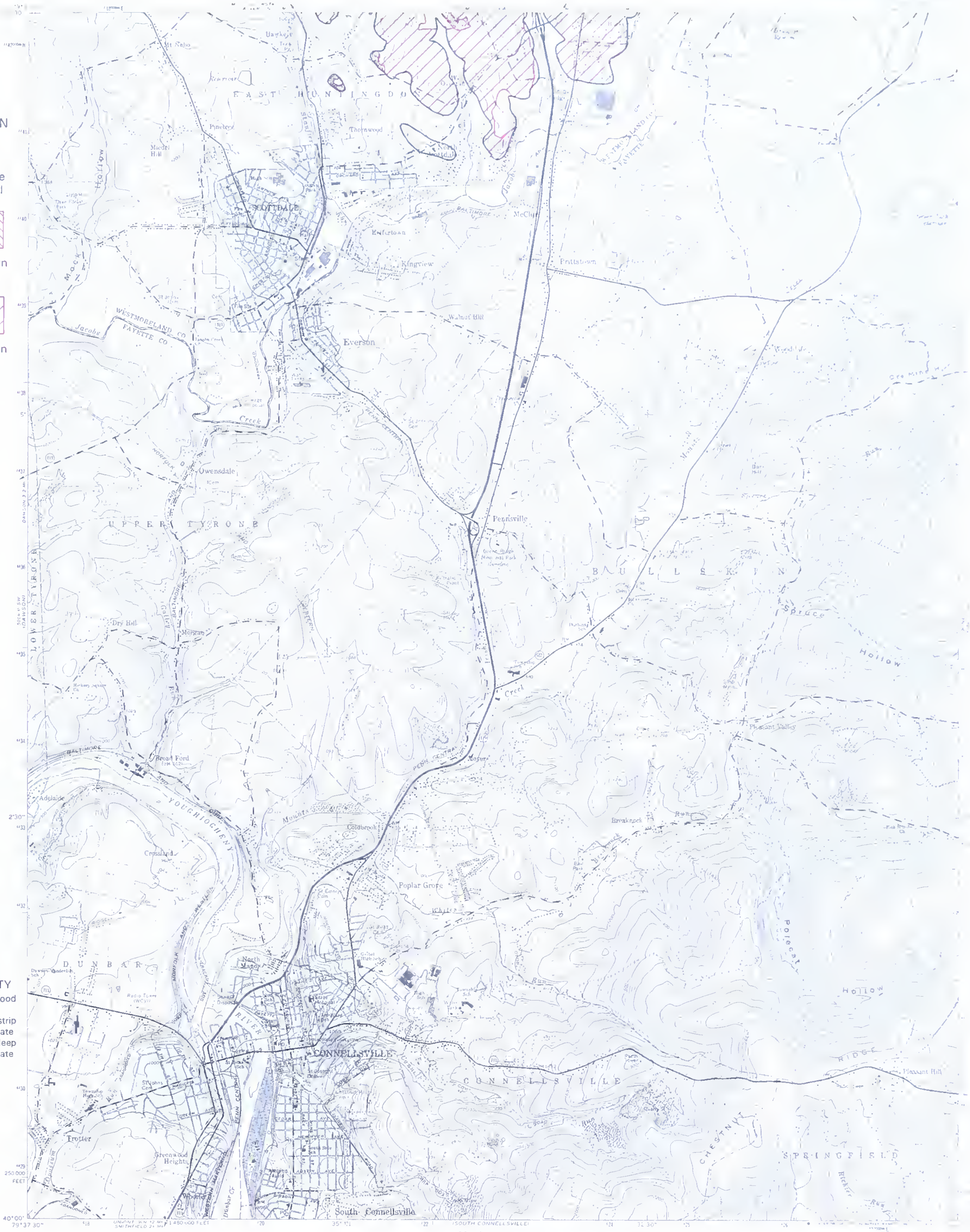
BRADDOCK

SOURCE

Structure contours by V. W. Skema based on contours extended from adjacent area (Dodge, C. H., compiler (1985), *Coal resources of Allegheny County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 89, Pt. 1, p. 14).

STRUCTURE CONTOURS

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



EXPLANATION

〜 Crop line of the Pittsburgh coal

▨ Extent of known strip mining

▨ Extent of known deep mining

MAP RELIABILITY

Coal crop line—good to very good

Limits of known strip mining—approximate

Limits of known deep mining—approximate

SOURCES

Crop line by V. W. Skema based on structure contours compiled from unpublished data and extended from adjacent area (Shaulis, J. R., compiler (1985), *Coal resources of Fayette County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 91, Pt. 1, p. 21).

Limits of strip mining based on interpretation of topographic map.

Limits of deep mining from unpublished mine maps.

CONNELLSVILLE

CROP LINE AND MINED-OUT AREAS OF THE
PITTSBURGH COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

CROP LINES

Redstone coal

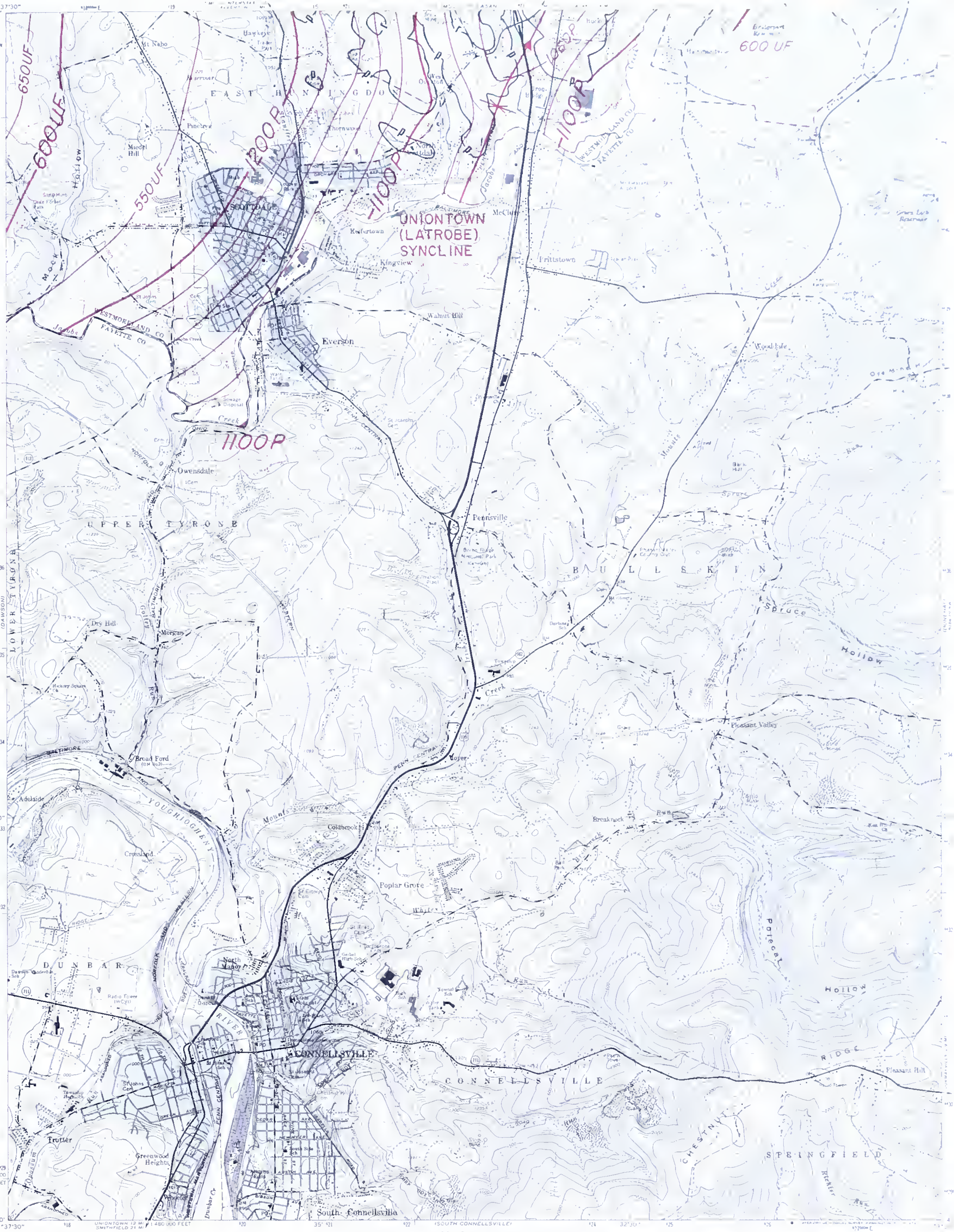
Pittsburgh coal

Syncline
Showing axial-plane trace and direction of plunge.

1200 P
Base of Pittsburgh coal
Contour interval 20 feet

600 UF
Base of Upper Freeport coal
Contour interval 50 feet.

Structure contours
Altitudes in feet above mean sea level.



MAP RELIABILITY
Coal crop lines—good to very good
Structure contours—good to very good

SOURCES

Crop lines by V. W. Skema based on structure contours and interval from structure contours.
Structure contours compiled by V. W. Skema from unpublished data and contours extended from adjacent area (Shaulis, J. R., compiler (1985), *Coal resources of Fayette County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 91, Pt. 1, p. 21).

COAL CROP LINES AND STRUCTURE CONTOURS

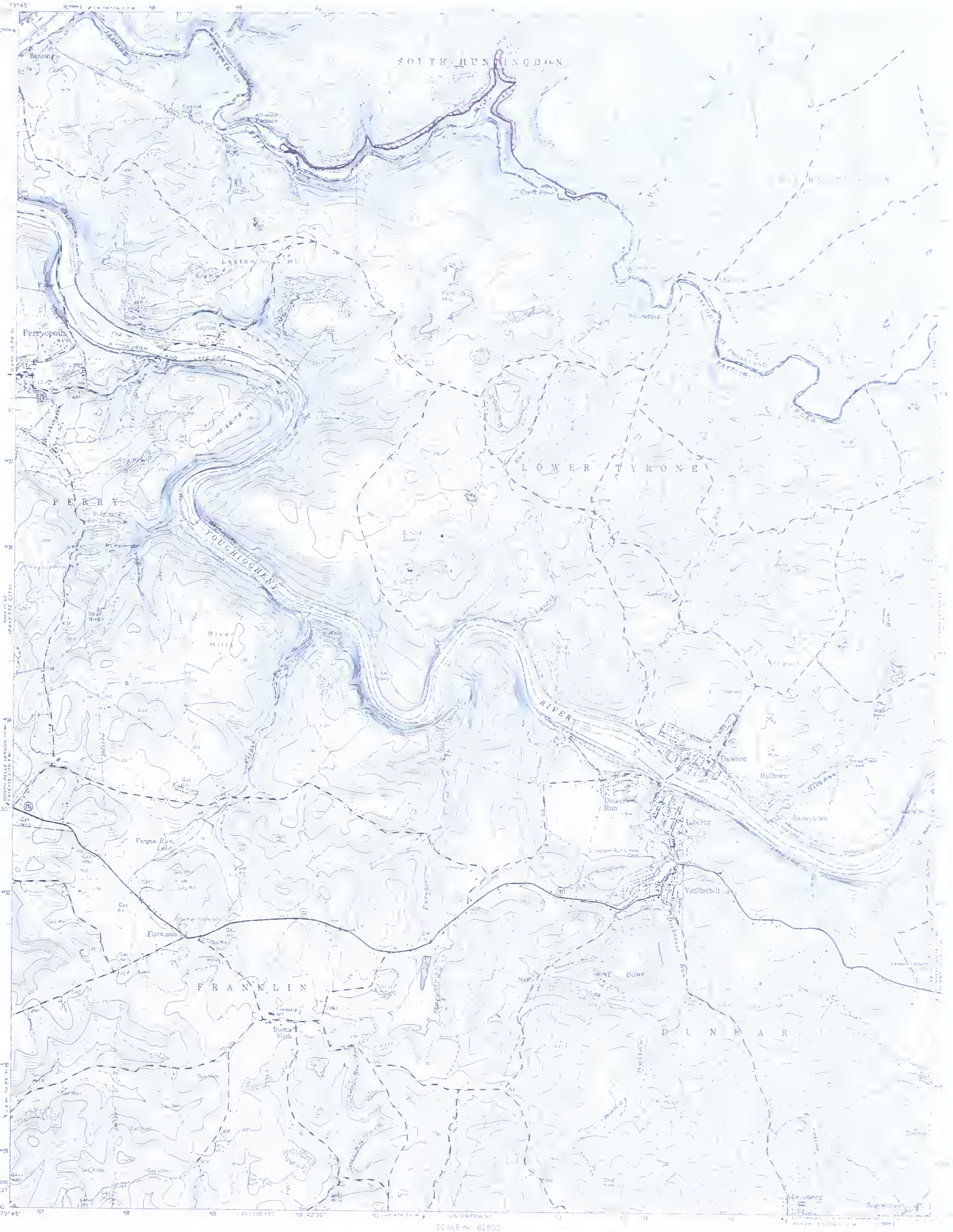
CONNELLSVILLE

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

〰 Crop line of the Middle Kittanning coal

▨ Extent of known strip mining



MAP RELIABILITY
Coal crop line—fair to good
Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Upper Freeport coal compiled from unpublished data and extended from adjacent area (Shaulis, J. R., compiler (1985), *Coal resources of Fayette County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 91, Pt. 1, p. 25), and also based on locations of strip mines on topographic map.

Limits of strip mining based on interpretation of topographic map.

CROP LINE AND MINED-OUT AREAS OF THE MIDDLE KITTANNING COAL

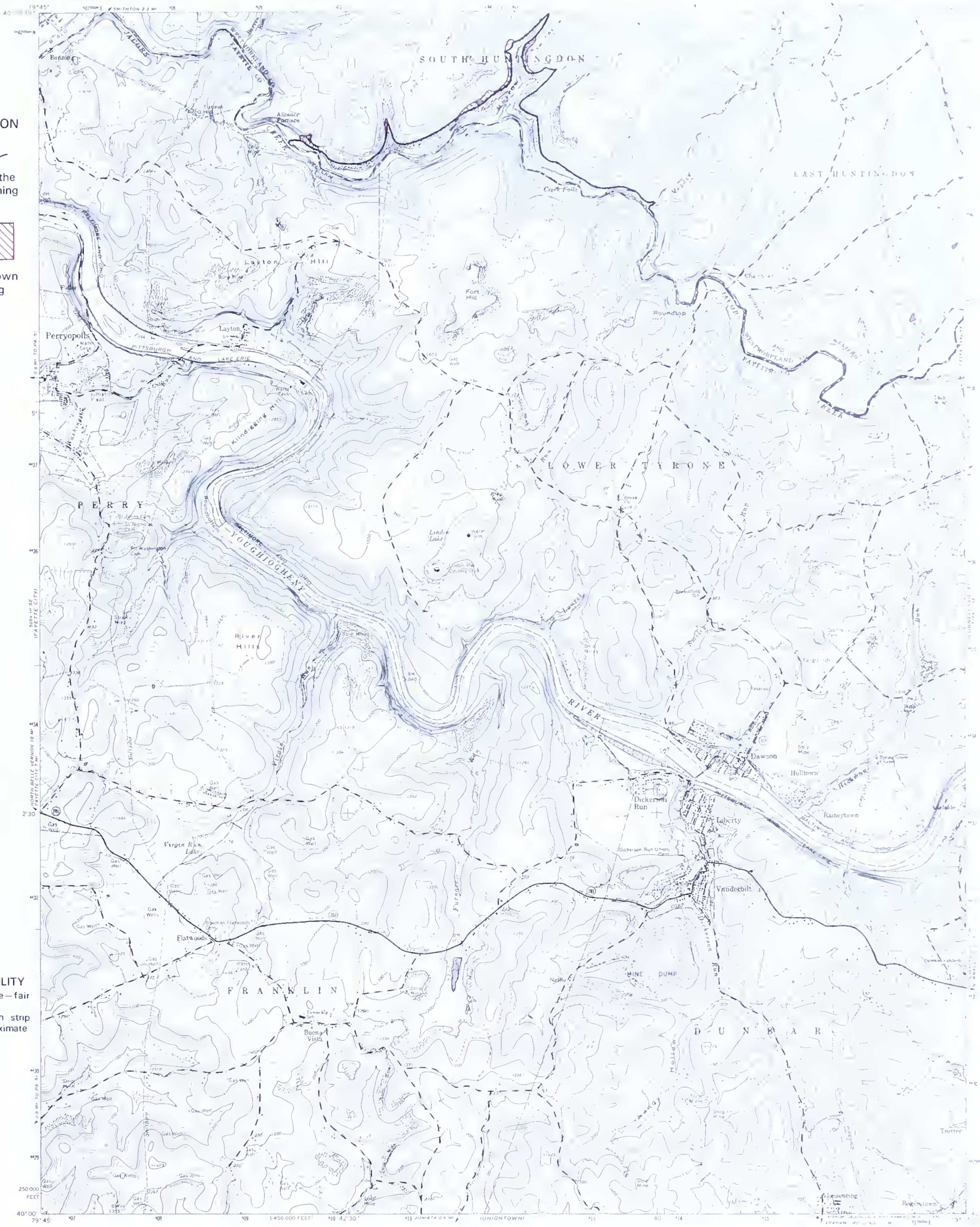
DAWSON

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

〰 Crop line of the Upper Kittanning coal

▨ Extent of known strip mining



MAP RELIABILITY

Coal crop line—fair to good
Limits of known strip mining—approximate

SOURCES

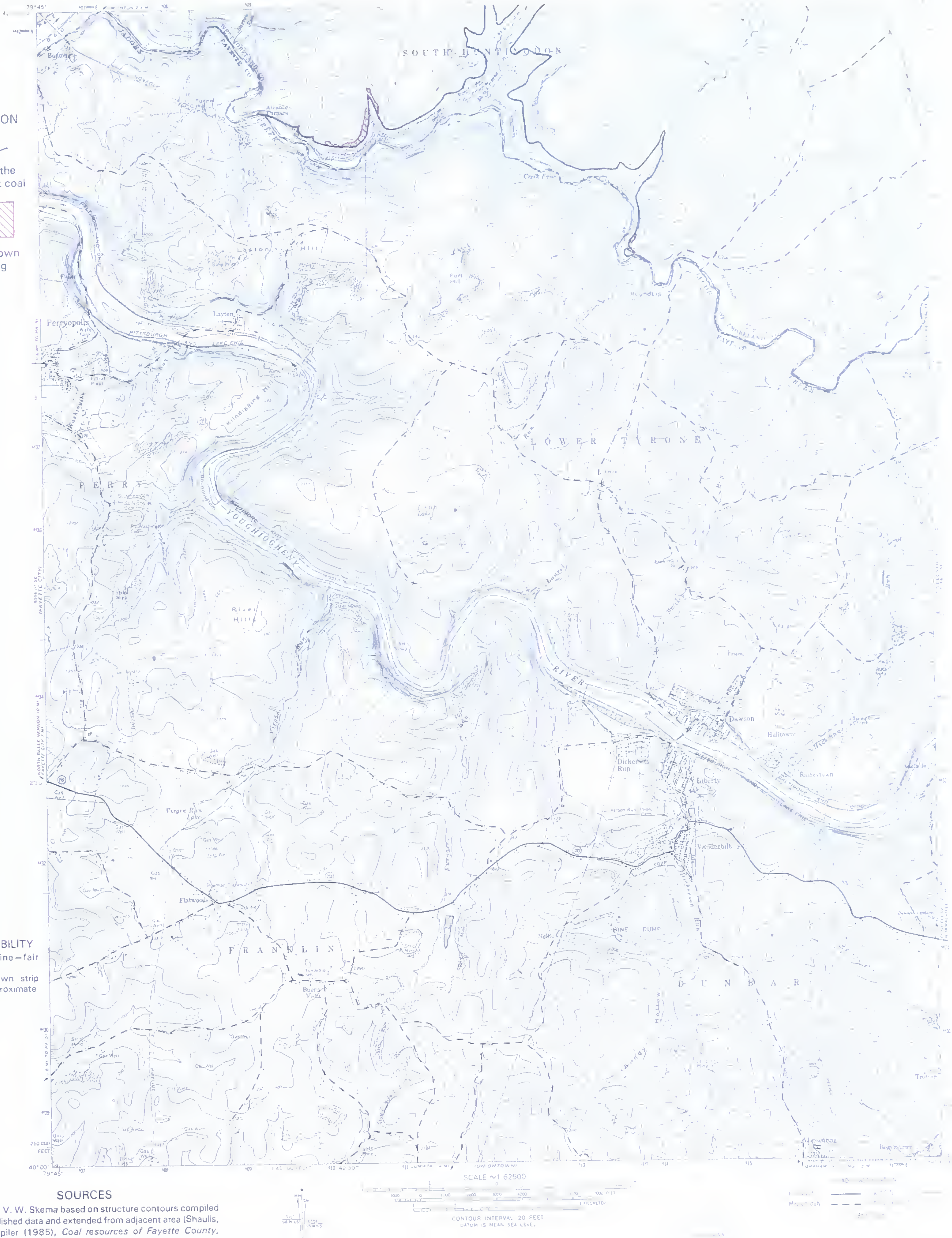
Crop line by V. W. Skema based on interval from structure contours on the Upper Freeport coal compiled from unpublished data and extended from adjacent area (Shaulis, J. R., compiler (1985), *Coal resources of Fayette County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 91, Pt. 1, p. 25), and also based on locations of strip mines on topographic map.

Limits of strip mining based on interpretation of topographic map.

DAWSON

CROP LINE AND MINED-OUT AREAS OF THE UPPER KITTANNING COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



DAWSON

EXPLANATION

～ Crop line of the Upper Freeport coal

▨ Extent of known strip mining

MAP RELIABILITY

Coal crop line—fair to good
Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on structure contours compiled from unpublished data and extended from adjacent area (Shaulis, J. R., compiler (1985), *Coal resources of Fayette County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 91, Pt. 1, p. 25).
Limits of strip mining based on interpretation of topographic map and on field checking.

CROP LINE AND MINED-OUT AREAS OF THE

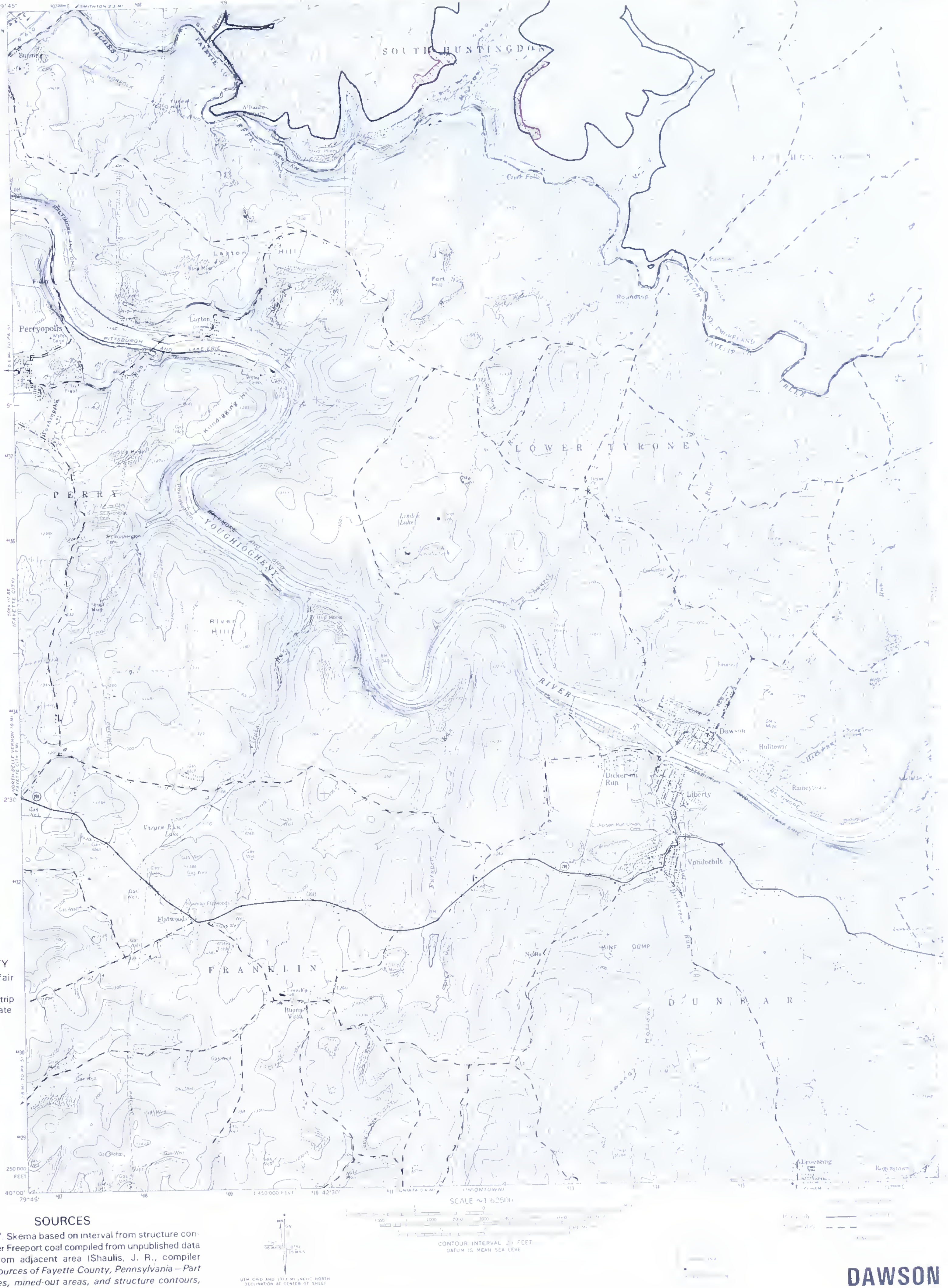
UPPER FREEPORT COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

〰 Crop line of the Brush Creek coal

▨ Extent of known strip mining



MAP RELIABILITY
Coal crop line—fair to good
Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Upper Freeport coal compiled from unpublished data and extended from adjacent area (Shaulis, J. R., compiler (1985), *Coal resources of Fayette County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours,* Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 91, Pt. 1, p. 25), and also based on locations of strip mines on topographic map.

Limits of strip mining based on interpretation of topographic map.

DAWSON

CROP LINE AND MINED-OUT AREAS OF THE

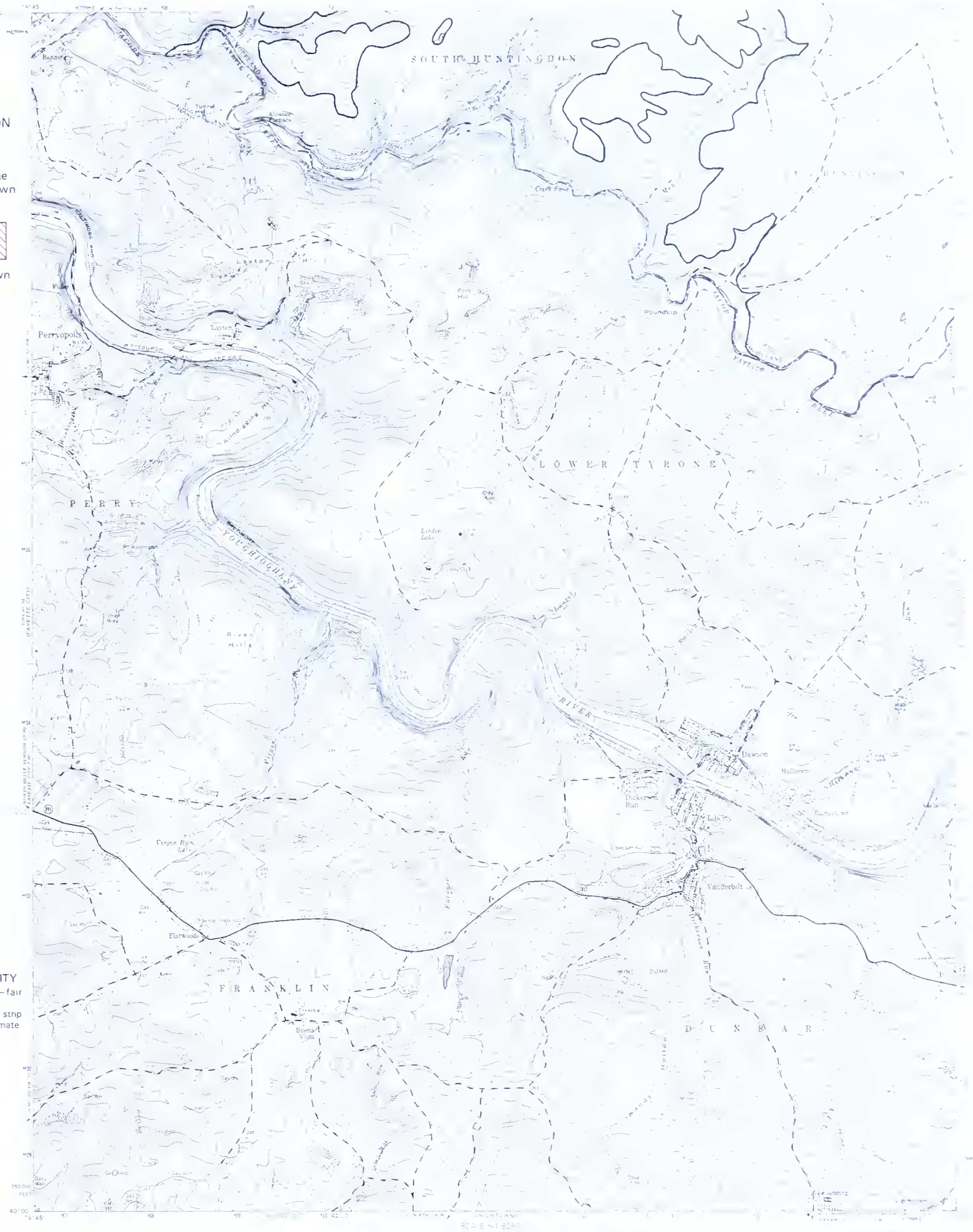
BRUSH CREEK COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

～ Crop line of the Lower Bakerstown coal

▨ Extent of known strip mining



MAP RELIABILITY
Coal crop line—fair to good
Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Upper Freeport coal compiled from unpublished data and extended from adjacent area (Shaulis, J. R., compiler (1985), *Coal resources of Fayette County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours,* Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 91, Pt. 1, p. 25), and also based on location of strip mine on topographic map.
Limits of strip mining based on interpretation of topographic map.

CROP LINE AND MINED-OUT AREA OF THE
LOWER BAKERSTOWN COAL

DAWSON

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

CROP LINES

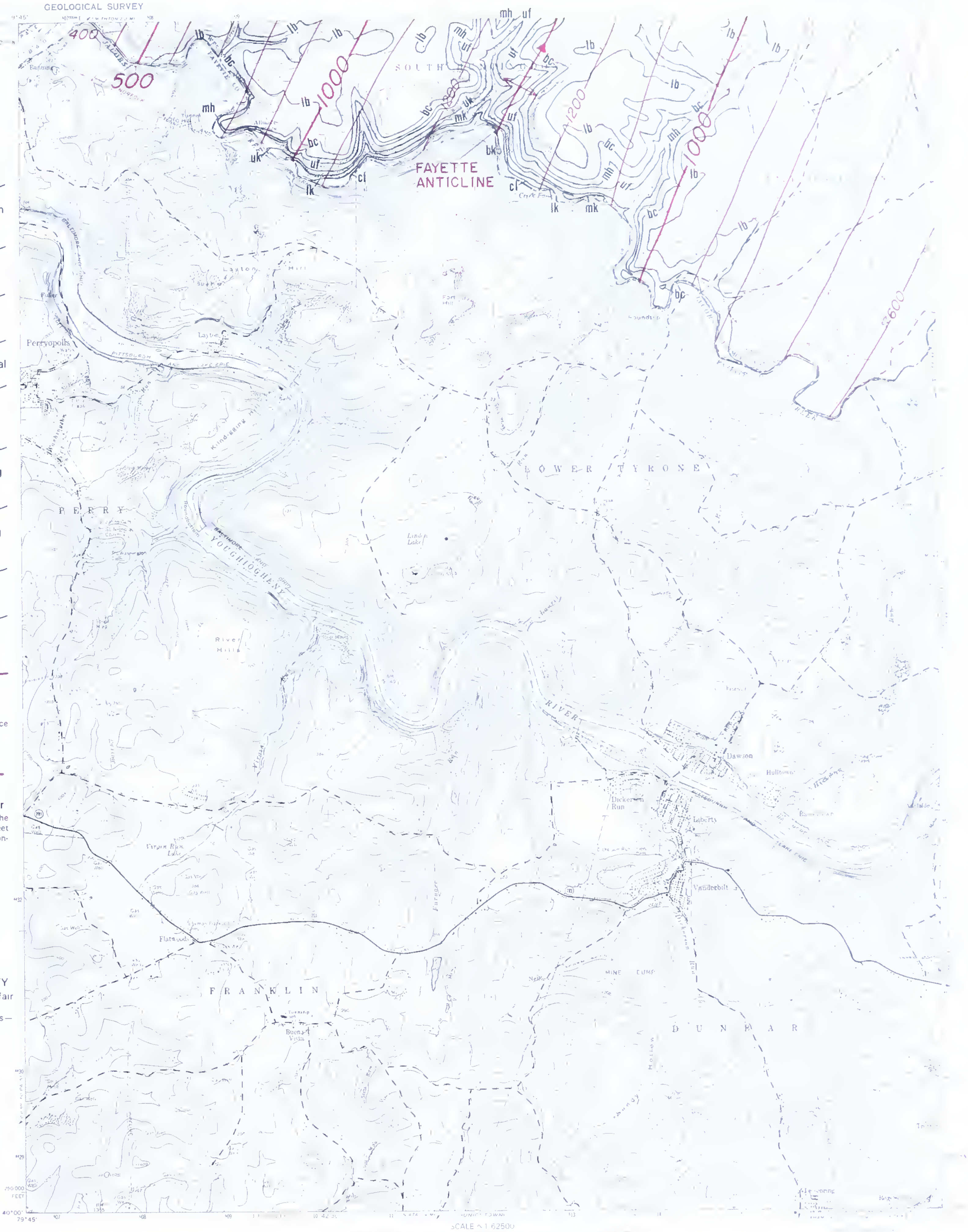
- lb — Lower Bakerstown coal
- bc — Brush Creek coal
- mh — Mahoning coal
- uf — Upper Freeport coal
- uk — Upper Kittanning coal
- mk — Middle Kittanning coal
- lk — Lower Kittanning coal
- cl — Clarion coal
- bk — Brookville coal

Anticline
Showing axial-plane trace and direction of plunge.

—500—
Structure contour
Altitude of the base of the Upper Freeport coal, in feet above mean sea level. Contour interval 100 feet.

MAP RELIABILITY

Coal crop lines—fair to good
Structure contours—fair to good



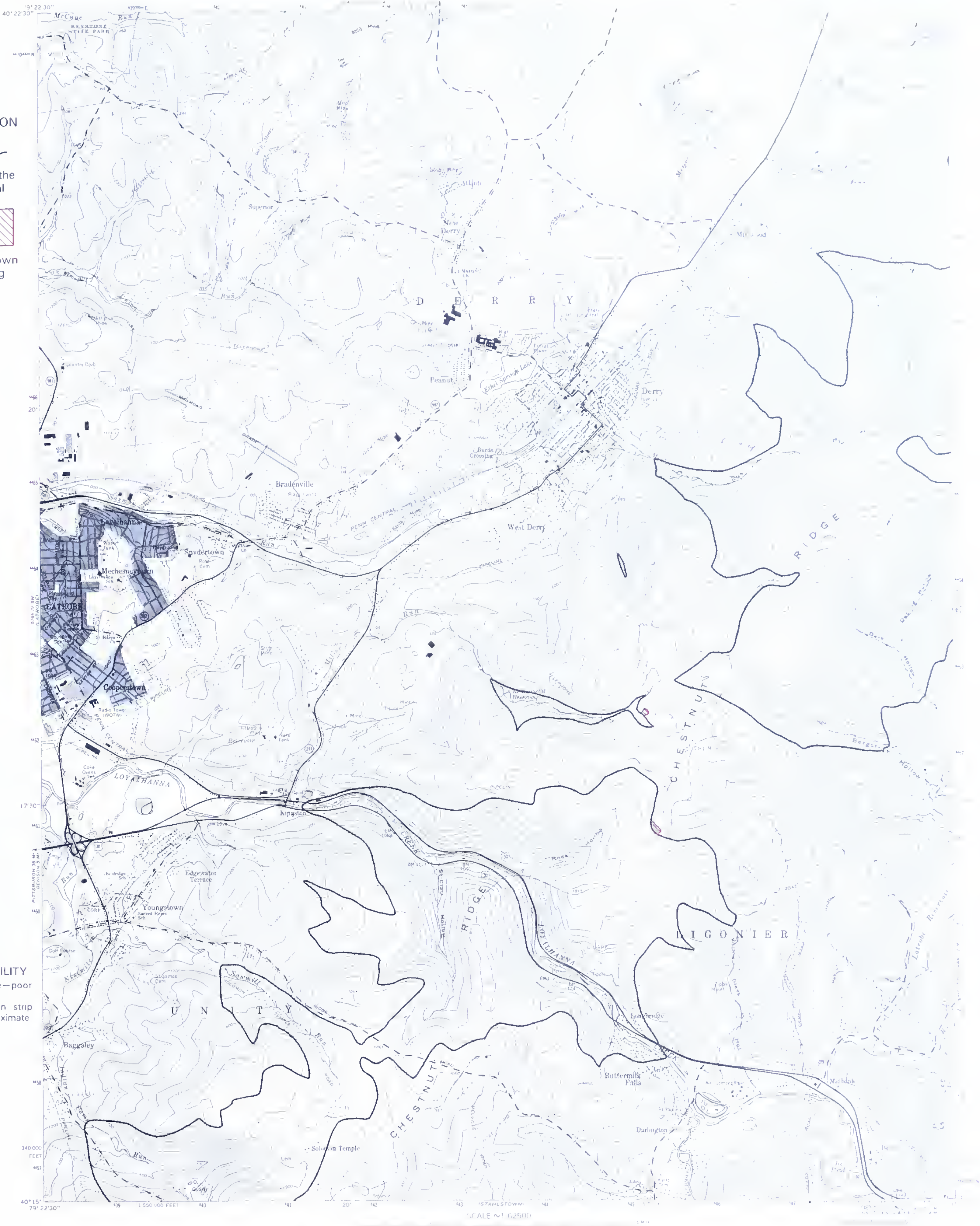
SOURCES

Crop lines by V. W. Skema based on structure contours and intervals from structure contours, and location of strip mines on topographic map.
Structure contours compiled by V. W. Skema from unpublished data and contours extended from adjacent area (Shaulis, J. R., compiler (1985), *Coal resources of Fayette County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours,* Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 91, Pt. 1, p. 25).

COAL CROP LINES AND STRUCTURE CONTOURS

DAWSON

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



EXPLANATION

~ Crop line of the Mercer coal

▨ Extent of known strip mining

MAP RELIABILITY

Coal crop line—poor to good

Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Upper Freeport coal compiled from unpublished data, and also based on locations of strip mines on topographic map.

Limits of strip mining based on interpretation of topographic map and aerial photographs.

DERRY

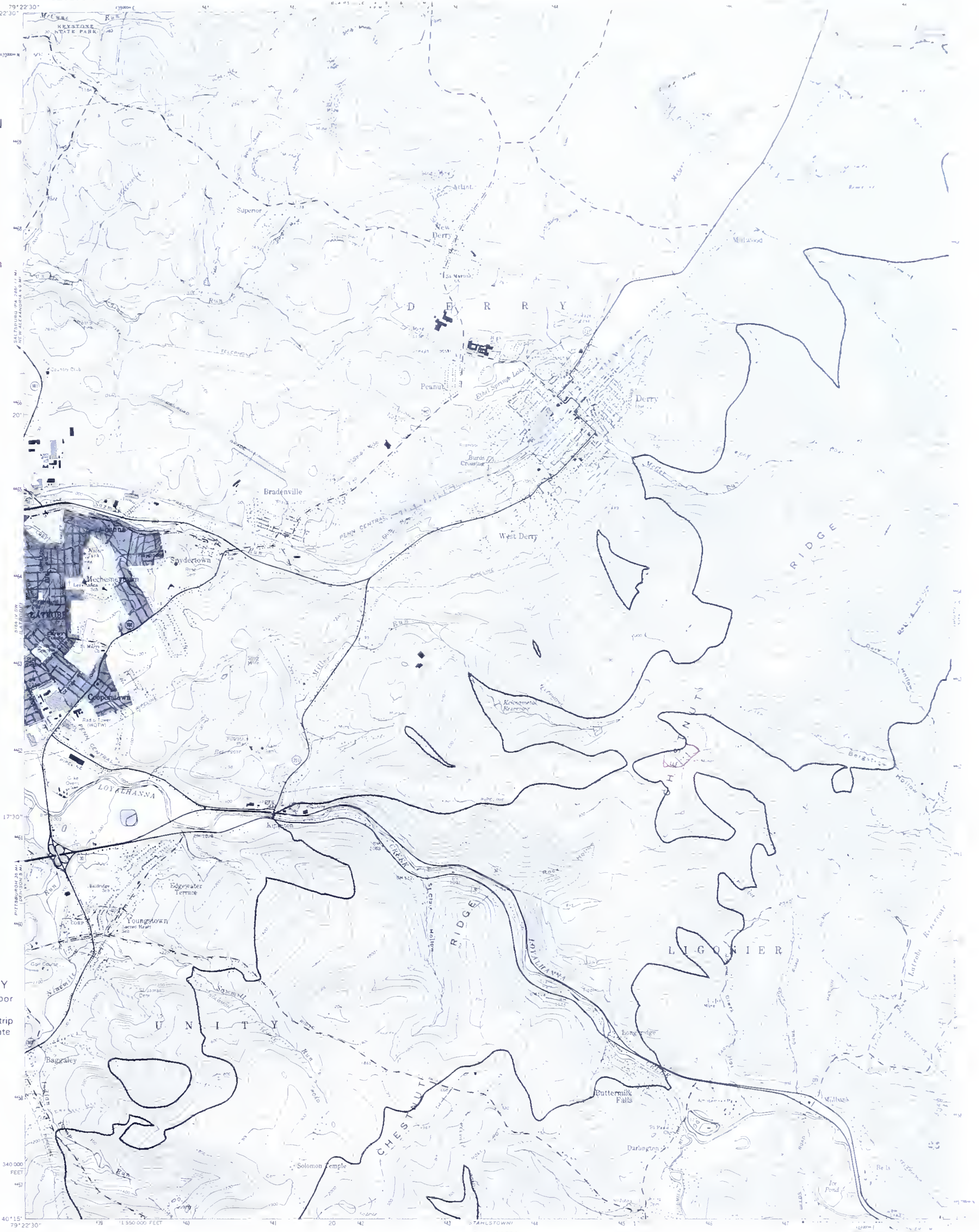
CROP LINE AND MINED-OUT AREAS OF THE
MERCER COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

〜 Crop line of the Clarion coal

▨ Extent of known strip mining



MAP RELIABILITY

Coal crop line—poor to good

Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Upper Freeport coal compiled from unpublished data.

Limits of strip mining based on interpretation of aerial photographs.

DERRY

CROP LINE AND MINED-OUT AREA OF THE

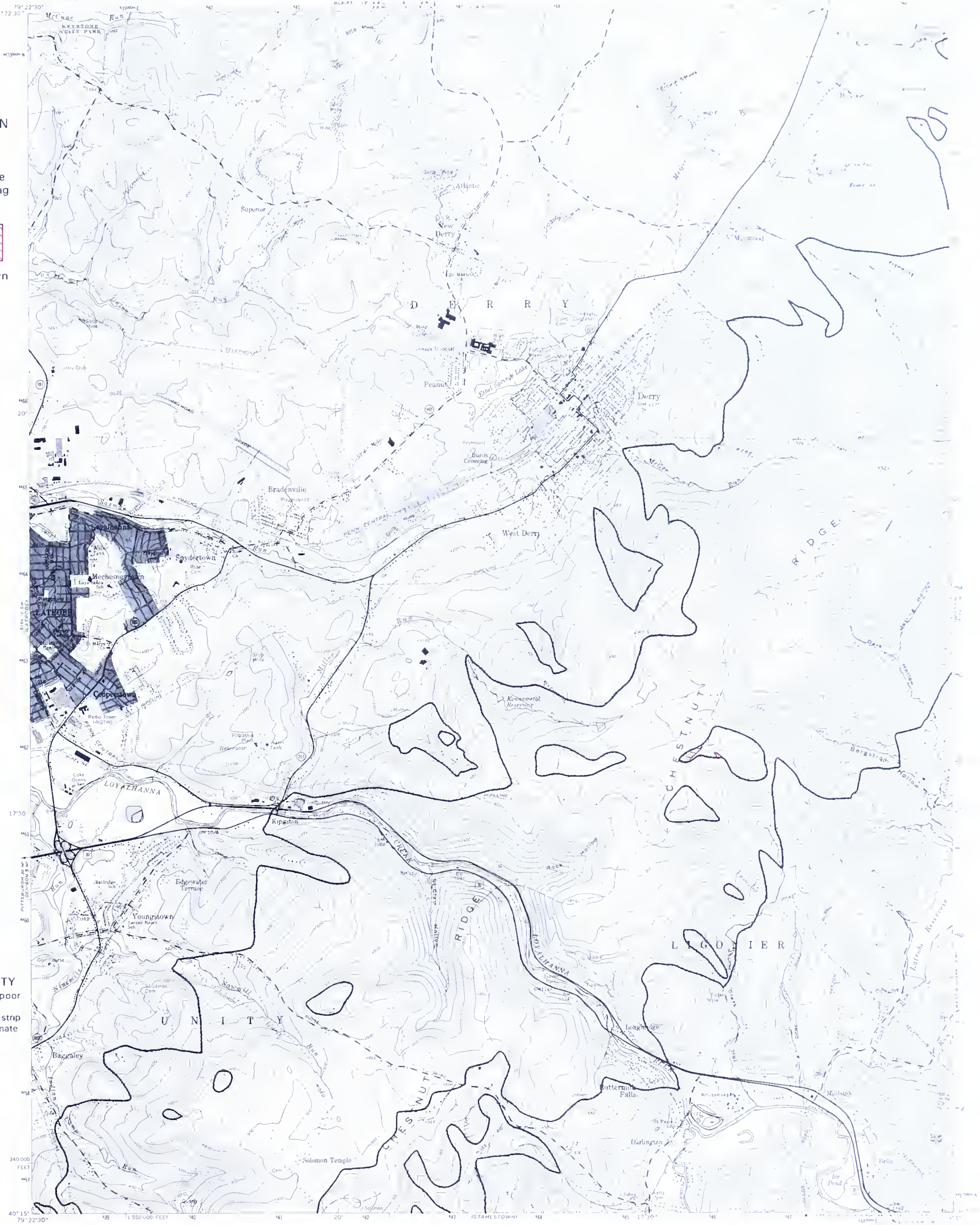
CLARION COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

〜 Crop line of the Lower Kittanning coal

▨ Extent of known strip mining



MAP RELIABILITY

Coal crop line—poor to good
Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Upper Freeport coal compiled from unpublished data, and also based on locations of strip mines on topographic map.

Limits of strip mining based on interpretation of topographic map and aerial photographs.

DERRY

CROP LINE AND MINED-OUT AREAS OF THE
LOWER KITTANNING COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

Crop line of the Middle Kittanning coal

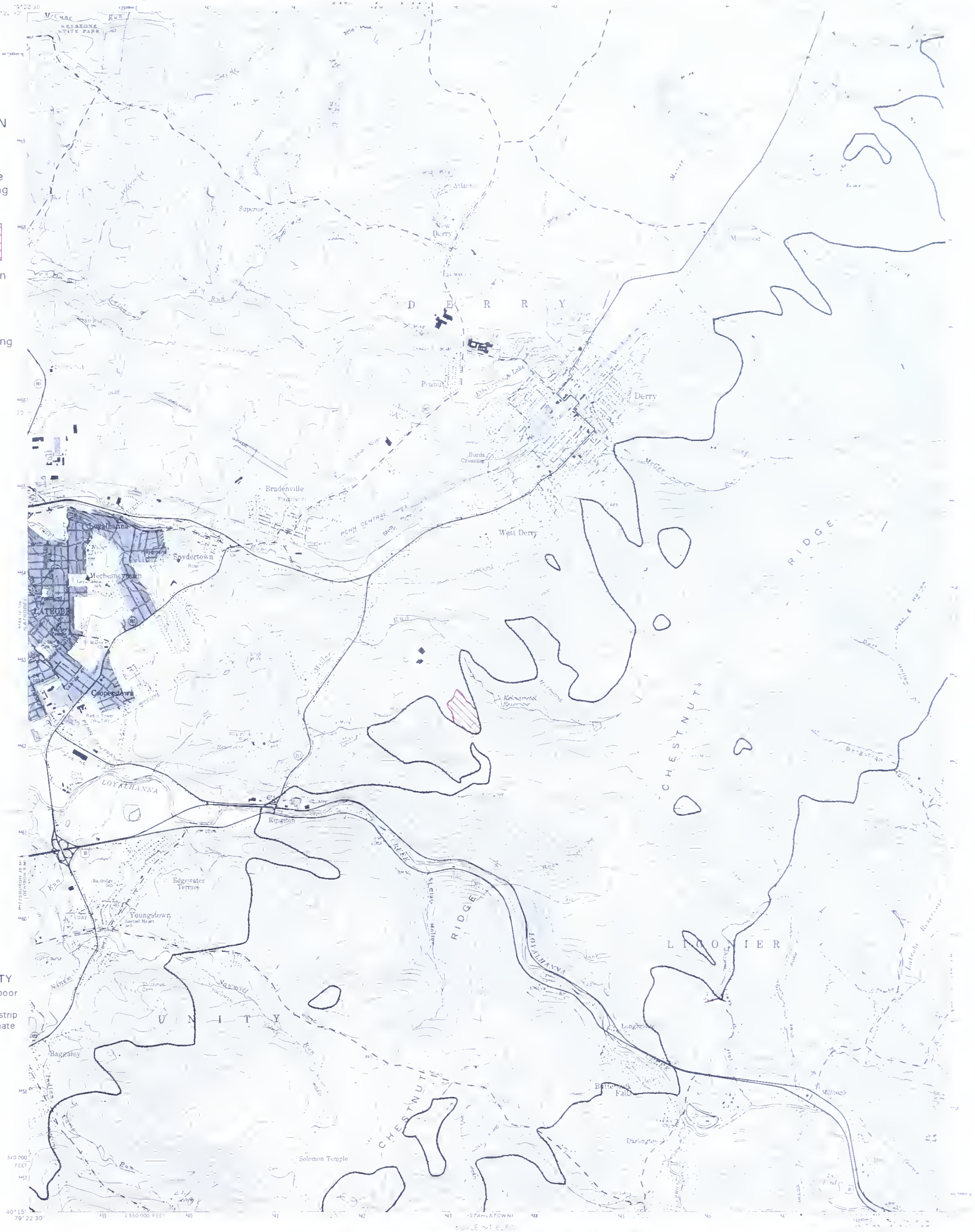
▨ Extent of known strip mining

Deep-mine opening

MAP RELIABILITY

Coal crop line—poor to good

Limits of known strip mining—approximate



SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Upper Freeport coal compiled from unpublished data.

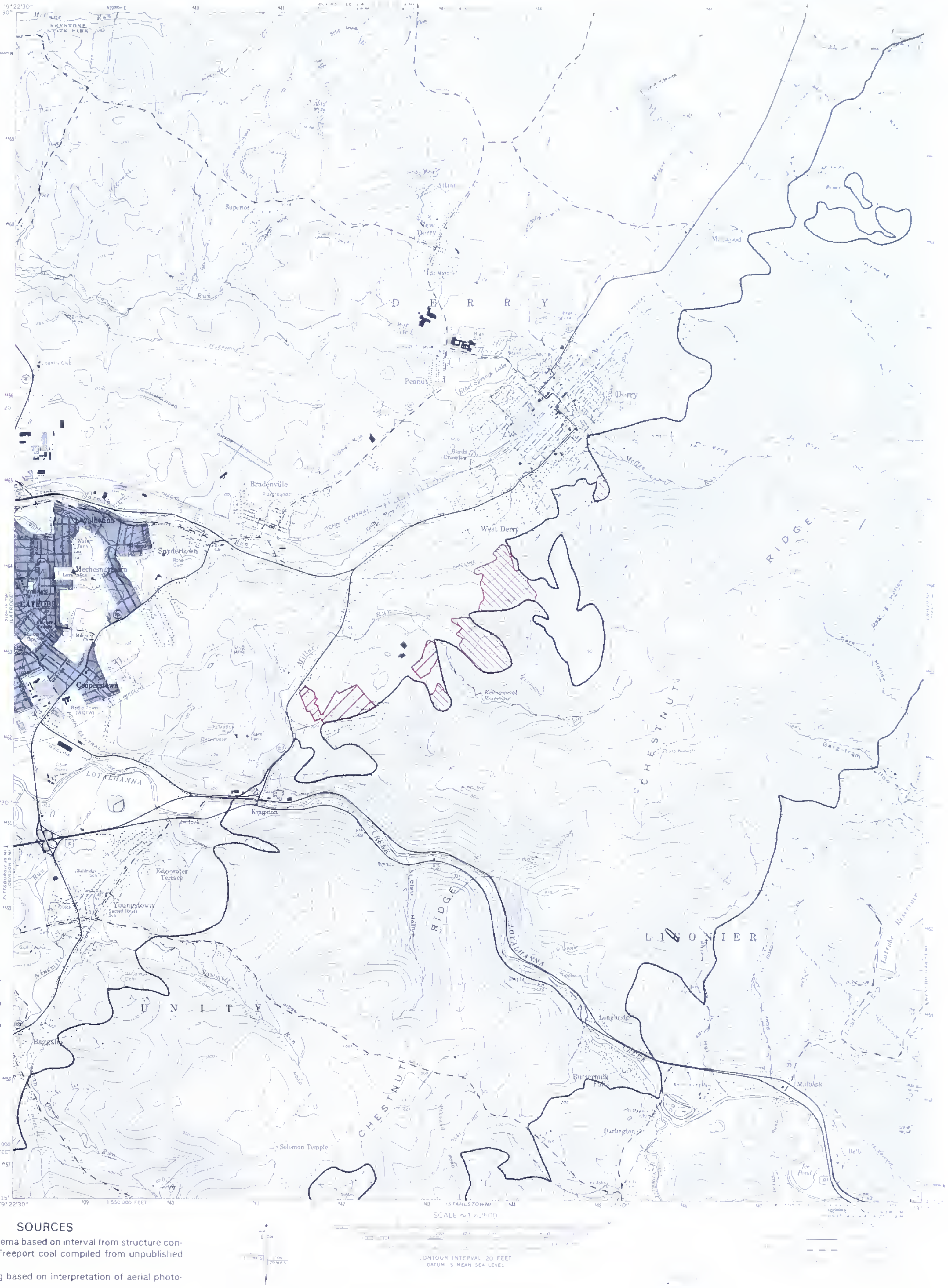
Limits of strip mining based on interpretation of aerial photographs.

Location of deep-mine opening from Richardson, G. B. (1934). *Somerset-Windber folio, Pennsylvania*, U.S. Geological Survey Geologic Atlas of the U.S., Folio 224, 14 p.

DERRY

CROP LINE AND MINED-OUT AREAS OF THE
MIDDLE KITTANNING COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



EXPLANATION

〜 Crop line of the Upper Kittanning coal

▨ Extent of known strip mining

▨ Extent of known deep mining

MAP RELIABILITY

Coal crop line—poor to good

Limits of known strip mining—approximate

Limits of known deep mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Upper Freeport coal compiled from unpublished data.

Limits of strip mining based on interpretation of aerial photographs.

Limits of deep mining from unpublished mine maps.

DERRY

CROP LINE AND MINED-OUT AREAS OF THE

UPPER KITTANNING COAL

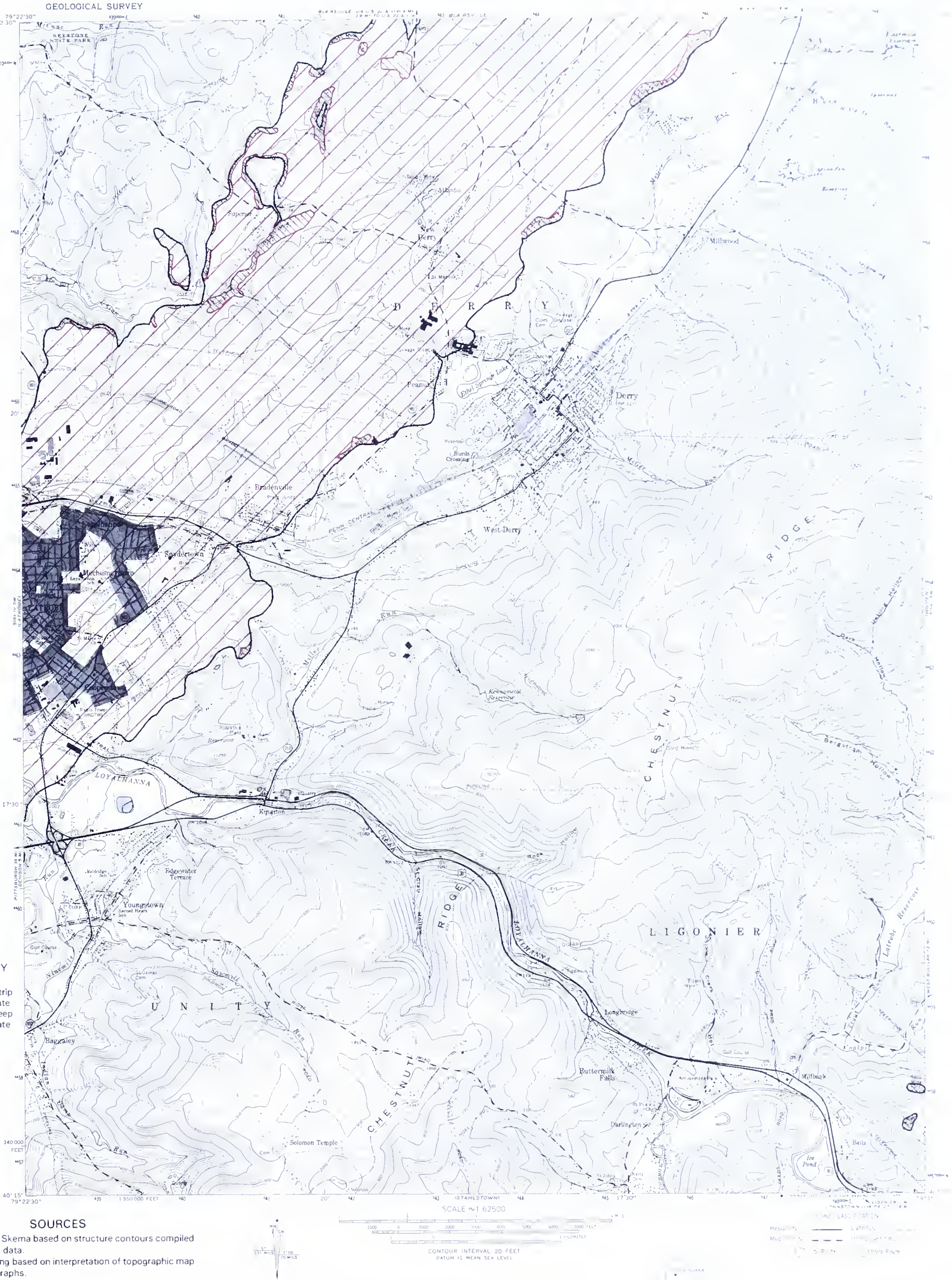
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

〰 Crop line of the Pittsburgh coal

▨ Extent of known strip mining

▨ Extent of known deep mining



MAP RELIABILITY

Coal crop line—good
Limits of known strip mining—approximate
Limits of known deep mining—approximate

SOURCES

Crop line by V. W. Skema based on structure contours compiled from unpublished data.
Limits of strip mining based on interpretation of topographic map and aerial photographs.
Limits of deep mining from unpublished mine maps.

DERRY

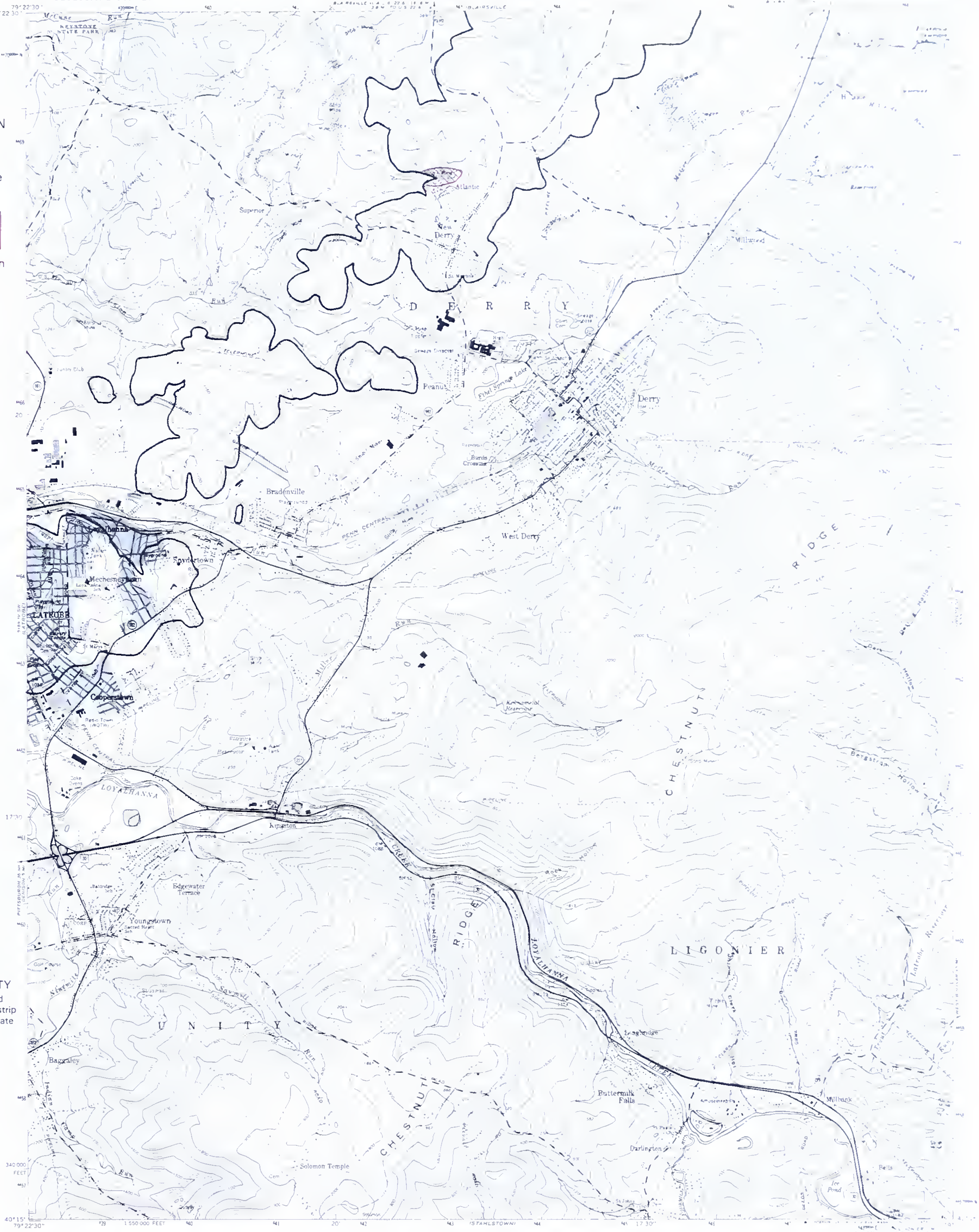
CROP LINE AND MINED-OUT AREAS OF THE
PITTSBURGH COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

～ Crop line of the Sewickley coal

▨ Extent of known strip mining



SCALE 1:62500

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

MAP RELIABILITY

Coal crop line—good
Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Pittsburgh coal compiled from unpublished data, and also based on location of strip mine on topographic map. Limits of strip mining based on interpretation of topographic map.

DERRY

CROP LINE AND MINED-OUT AREA OF THE
SEWICKLEY COAL

EXPLANATION

CROP LINES

—s— Sewickley coal

—r— Redstone coal

—p— Pittsburgh coal

—bc— Brush Creek coal

—mh— Mahoning coal

—uf— Upper Freeport coal

—uk— Upper Kittanning coal

—mk— Middle Kittanning coal

—lk— Lower Kittanning coal

—cl— Clarion coal

—bk— Brookville coal

—mr— Mercer coal

Anticline
Showing axial-plane trace and direction of plunge.

Syncline
Showing axial-plane trace and direction of plunge.

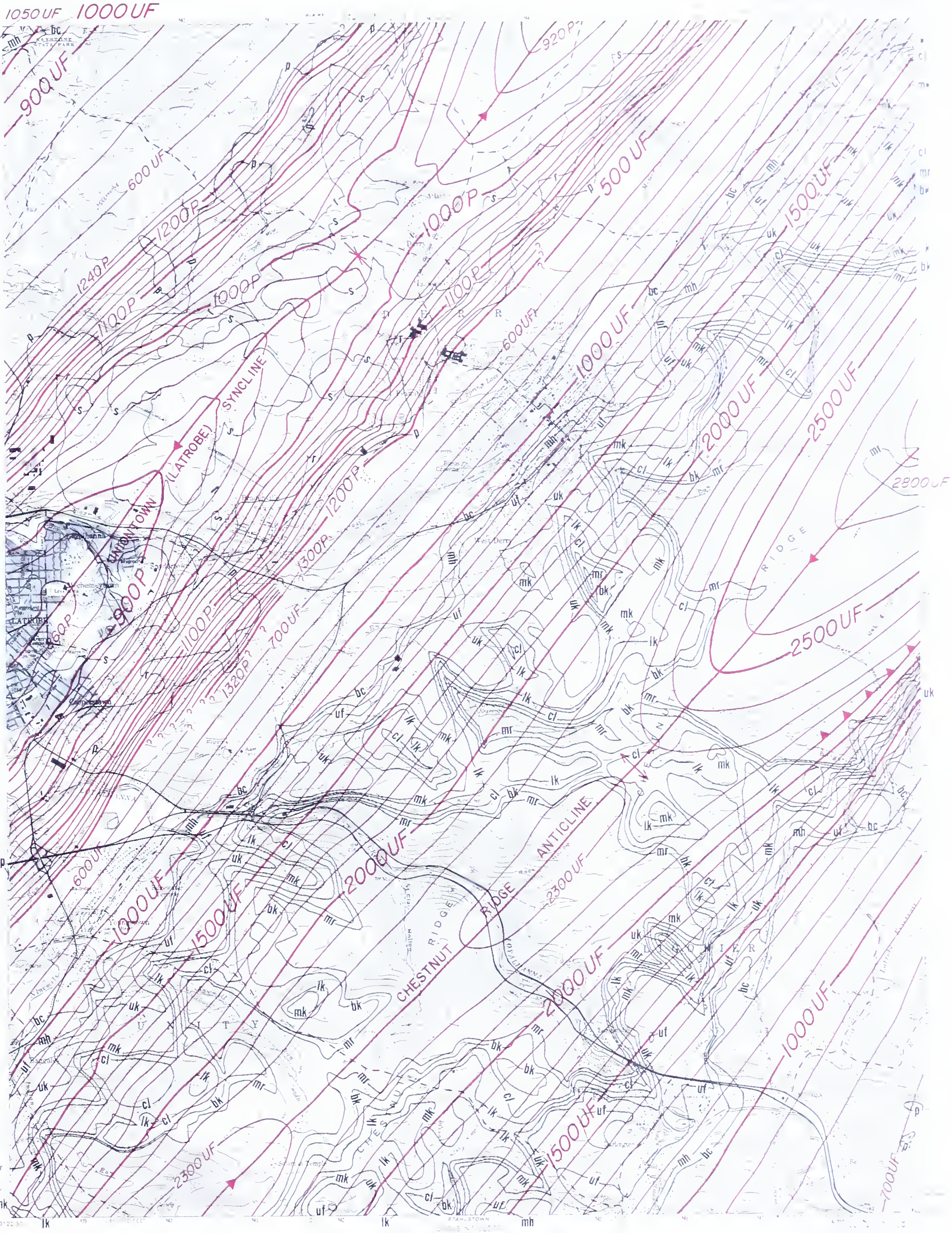
—900 P— Base of Pittsburgh coal
Contour interval 20 feet.

—500 UF— Base of Upper Freeport coal
Contour intervals 50 and 100 feet.

Structure contours
Altitudes in feet above mean sea level

Reverse fault
High-angle fault. Sawteeth on upper plate.

MAP RELIABILITY
Coal crop lines—poor to good
Structure contours—poor to good



SOURCES

Crop lines by V. W. Skema based on structure contours and intervals from structure contours, and locations of strip mines on topographic map.
Structure contours compiled by V. W. Skema from unpublished data.
Position of reverse fault from Berg, T. M., and Dodge, C. M., compilers and editors (1981), *Atlas of preliminary geologic quadrangle maps of Pennsylvania*, Pennsylvania Geological Survey, 4th ser., Map 61, p. 164

COAL CROP LINES AND STRUCTURE CONTOURS

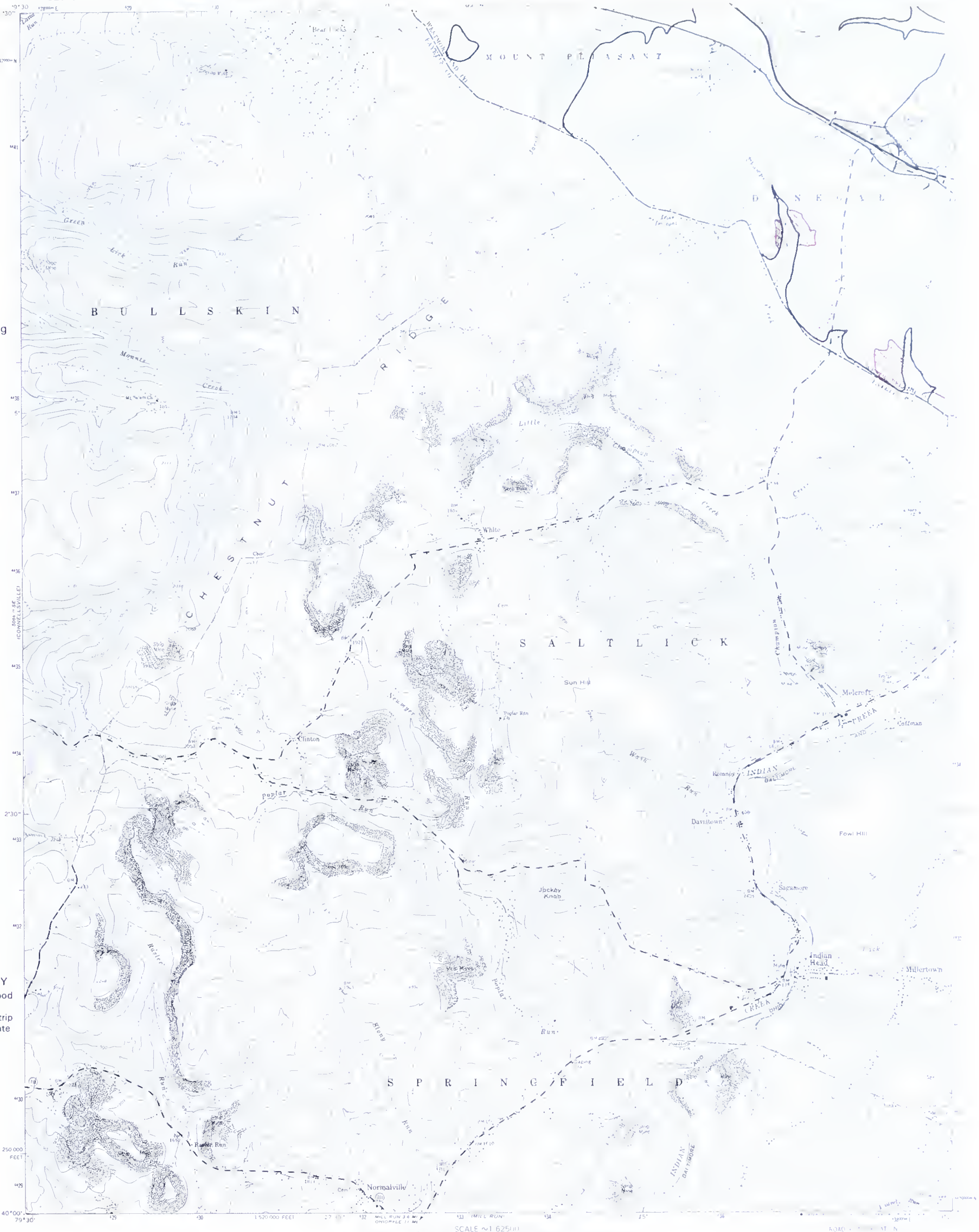
DERRY

EXPLANATION

Crop line of the Mahoning coal

▨ Extent of known strip mining

Deep-mine opening



MAP RELIABILITY

Coal crop line—good to very good
Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Upper Freeport coal compiled from unpublished data and extended from adjacent area (Shaulis, J. R., compiler (1985), *Coal resources of Fayette County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 91, Pt. 1, p. 31).

Limits of strip mining based on interpretation of topographic map and aerial photographs.

Location of deep-mine opening from Shaffner, M. N. (1963), *Geology and mineral resources of the Donegal quadrangle, Pennsylvania*, Pennsylvania Geological Survey, 4th ser., Atlas 48, 116 p.

CROP LINE AND MINED-OUT AREAS OF THE
MAHONING COAL

DONEGAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

CROP LINES

bc
Brush Creek coal

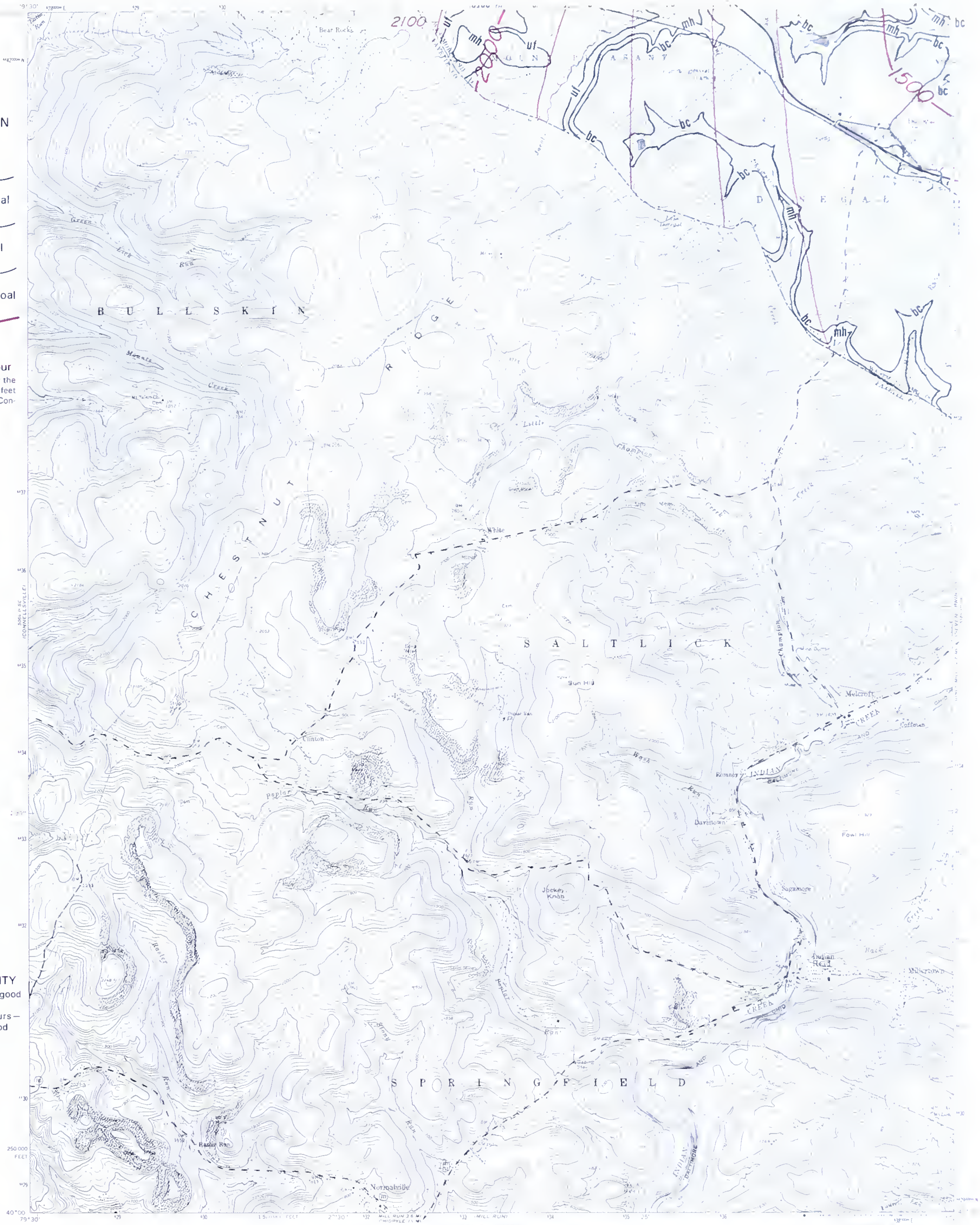
mh
Mahoning coal

uf
Upper Freeport coal

2000
Structure contour
Altitude of the base of the Upper Freeport coal, in feet above mean sea level. Contour interval 100 feet

MAP RELIABILITY

Coal crop lines—good to very good
Structure contours—good to very good



SOURCES

Crop lines by V. W. Skema based on structure contours and intervals from structure contours.
Structure contours compiled by V. W. Skema from unpublished data and contours extended from adjacent area (Shaulis, J. R., compiler (1985), *Coal resources of Fayette County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours,* Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 91, Pt. 1, p. 31).

DONEGAL

COAL CROP LINES AND STRUCTURE CONTOURS

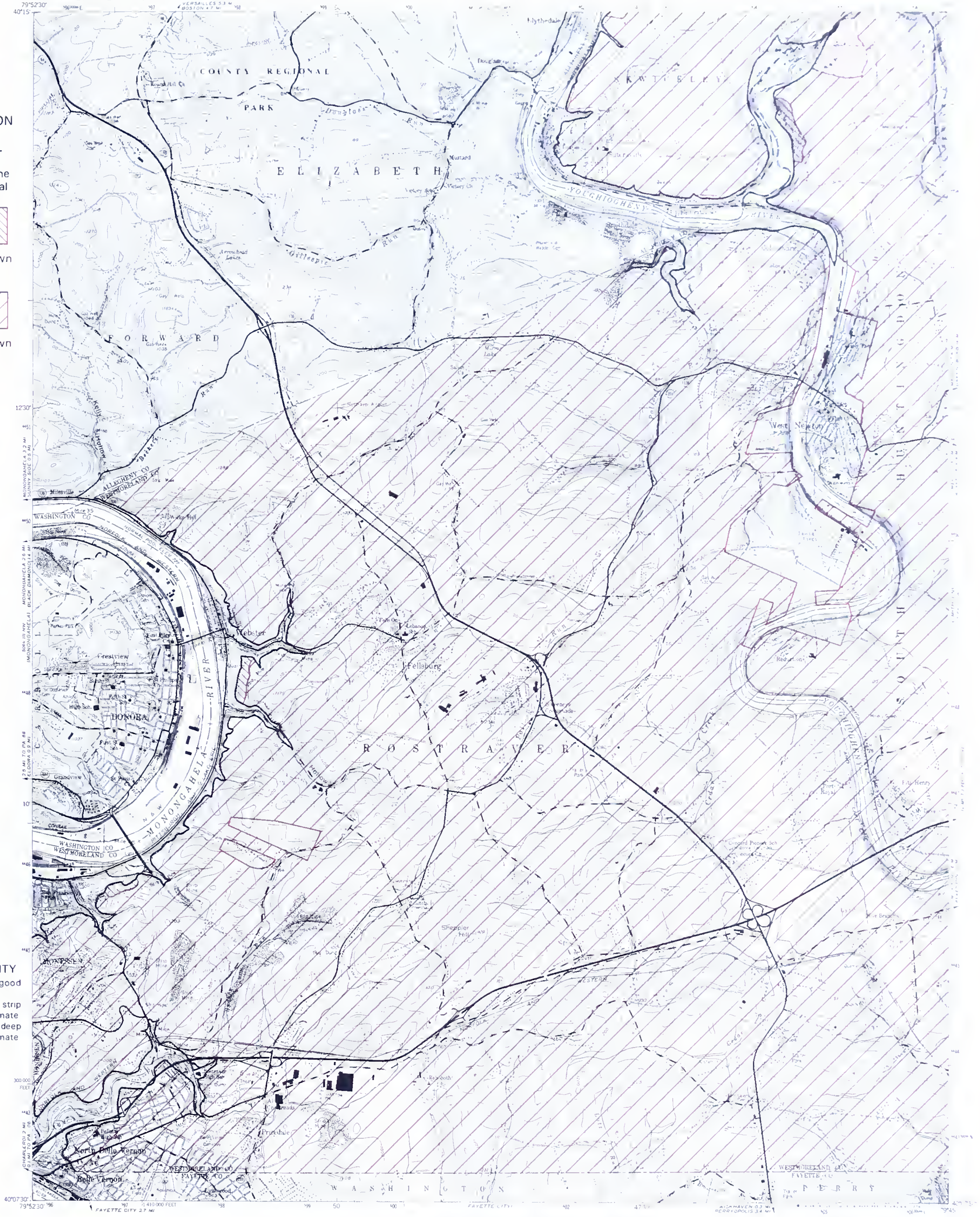
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

〰 Crop line of the Pittsburgh coal

▨ Extent of known strip mining

▨ Extent of known deep mining



MAP RELIABILITY

Coal crop line—good to very good
Limits of known strip mining—approximate
Limits of known deep mining—approximate

SOURCES

Crop line by V. W. Skema based on structure contours slightly modified from Wagner, W. R., Heyman, L., Craft, J. L., and others (1975), *Greater Pittsburgh Region structure contour map*, Pennsylvania Geological Survey, 4th ser., Map 43, scale 1:125,000; and extended from adjacent areas (Shaulis, J. R., compiler (1985), *Coal resources of Fayette County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 91, Pt. 1, p. 33; and Dodge, C. H., compiler (1985), *Coal resources of Allegheny County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 89, Pt. 1, p. 27, slightly modified).
Limits of strip mining based on interpretation of topographic map.
Limits of deep mining from Pennsylvania Department of Environmental Resources, Bureau of Mining and Reclamation (1978), unpublished map.

SCALE 1:62500

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

UTM GRID AND 1979 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

DONORA

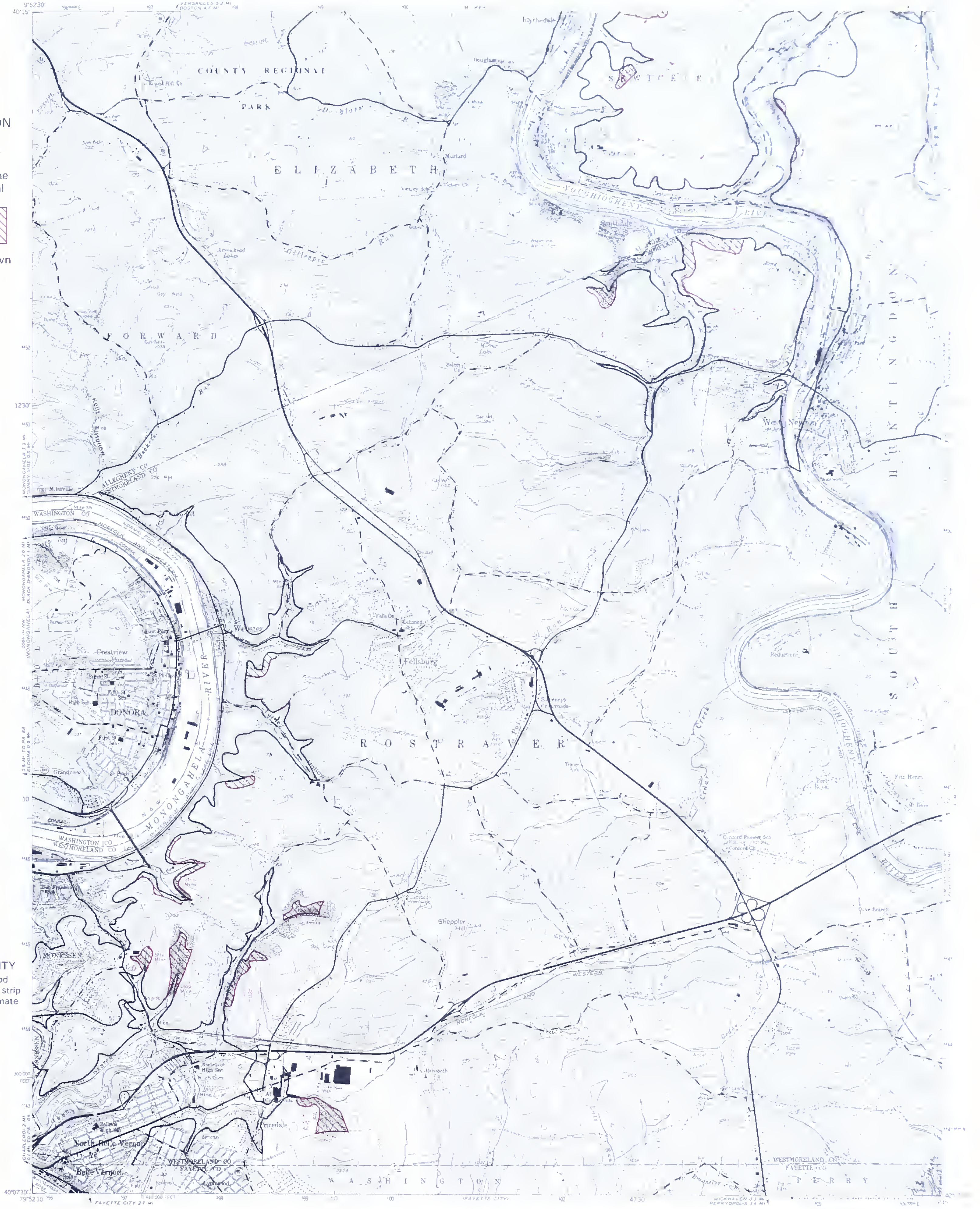
CROP LINE AND MINED-OUT AREAS OF THE PITTSBURGH COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

〰 Crop line of the Redstone coal

▨ Extent of known strip mining



MAP RELIABILITY
Coal crop line—good
Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Pittsburgh coal slightly modified from Wagner, W. R., Heyman, L., Craft, J. L., and others (1975), *Greater Pittsburgh Region structure contour map*, Pennsylvania Geological Survey, 4th ser., Map 43, scale 1:125,000; and extended from adjacent areas (Shaulis, J. R., compiler (1985), *Coal resources of Fayette County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 91, Pt. 1, p. 33; and Dodge, C. H., compiler (1985), *Coal resources of Allegheny County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 89, Pt. 1, p. 27, slightly modified). Limits of strip mining based on interpretation of topographic map.

SCALE 1:62500

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

DONORA

CROP LINE AND MINED-OUT AREAS OF THE
REDSTONE COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

CROP LINES

—w— Washington coal

—wb— Waynesburg coal

—r— Redstone coal

—p— Pittsburgh coal

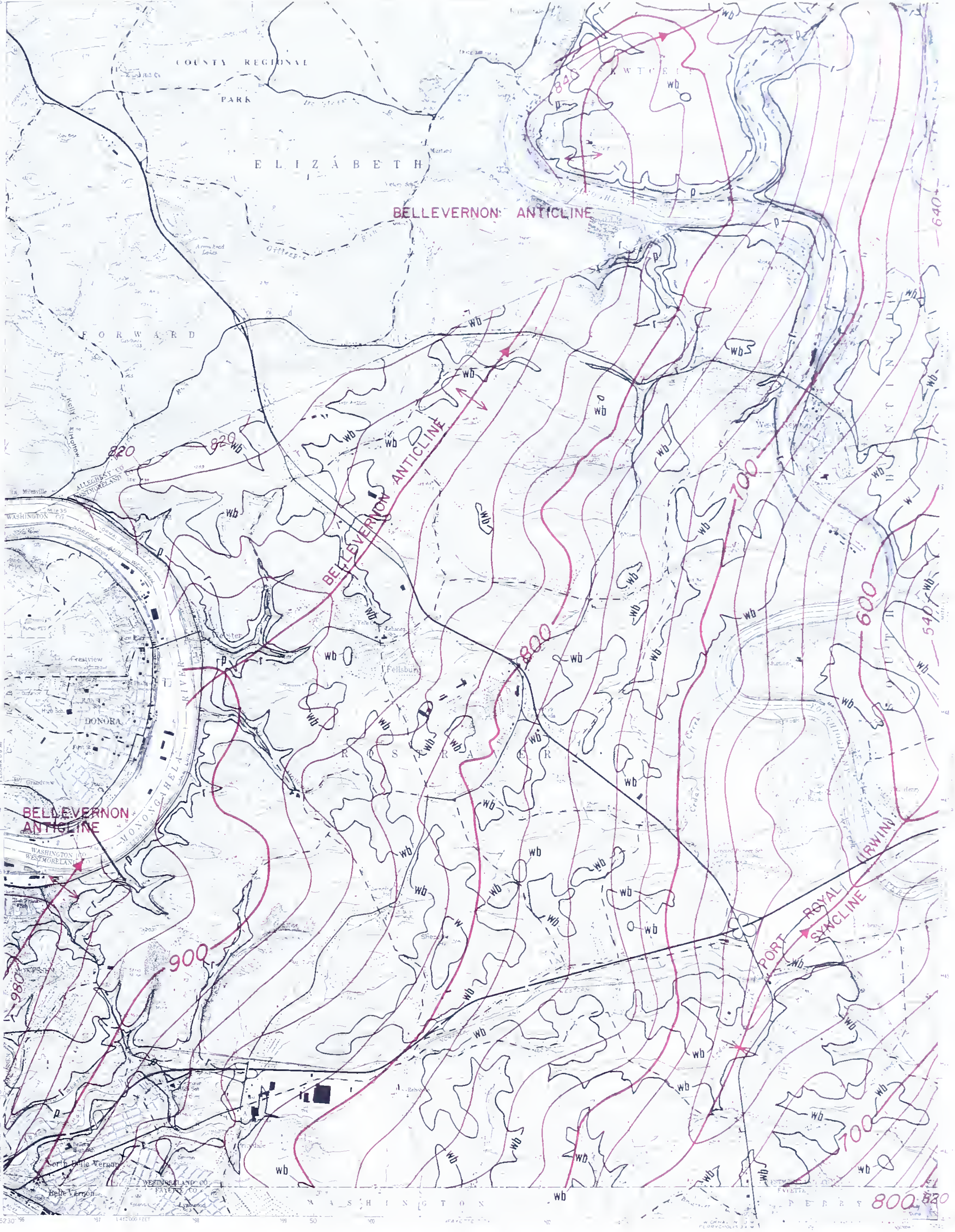
Anticline
Showing axial-plane trace and direction of plunge.

Syncline
Showing axial-plane trace and direction of plunge.

—800— Structure contour
Altitude of the base of the Pittsburgh coal, in feet above mean sea level. Contour interval 20 feet.

MAP RELIABILITY

Coal crop lines—good to very good
Structure contours—good to very good



SOURCES

Crop lines by V. W. Skema based on structure contours and intervals from structure contours.

Structure contours slightly modified by V. W. Skema from Wagner, W. R., Heyman, L., Craft, J. L., and others (1975), *Greater Pittsburgh Region structure contour map*, Pennsylvania Geological Survey, 4th ser., Map 43, scale 1:125,000; and extended from adjacent areas (Shaulis, J. R., compiler (1985), *Coal resources of Fayette County, Pennsylvania—Part 1, Coal Crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 91, Pt. 1, p. 33; and Dodge, C. H., compiler (1985), *Coal resources of Allegheny County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 89, Pt. 1, p. 27, slightly modified).

COAL CROP LINES AND STRUCTURE CONTOURS

DONORA

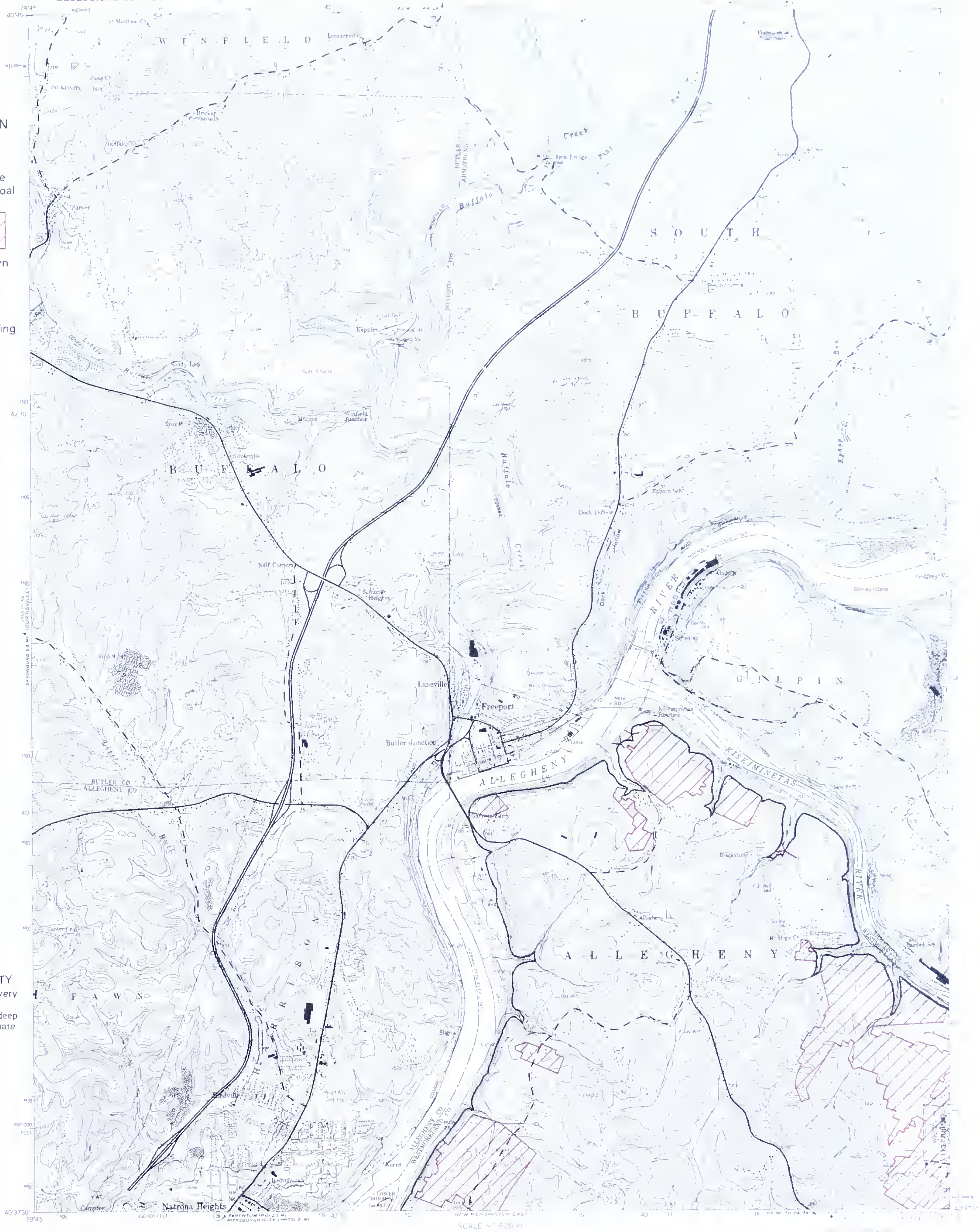
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

〰 Crop line of the Upper Freeport coal

▨ Extent of known deep mining

Y Deep-mine opening



MAP RELIABILITY
Coal crop line—very good
Limits of known deep mining—approximate

SOURCES

Crop line by V. W. Skema based on structure contours compiled from unpublished data and extended from adjacent areas (Dodge, C. H., compiler (1985), *Coal resources of Allegheny County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 89, Pt. 1, p. 32; and Bragonier, W. A. (1986), unpublished map for Freeport quadrangle, Armstrong County).

Limits of deep mining from unpublished mine maps.

Locations of deep-mine openings from Hughes, H. H. (1933), *Freeport quadrangle—Geology and mineral resources*, Pennsylvania Geological Survey, 4th ser., Atlas 36, 272 p.; and unpublished mine maps.

FREEPORT

CROP LINE AND MINED-OUT AREAS OF THE
UPPER FREEPORT COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

CROP LINES

bc
Brush Creek coal

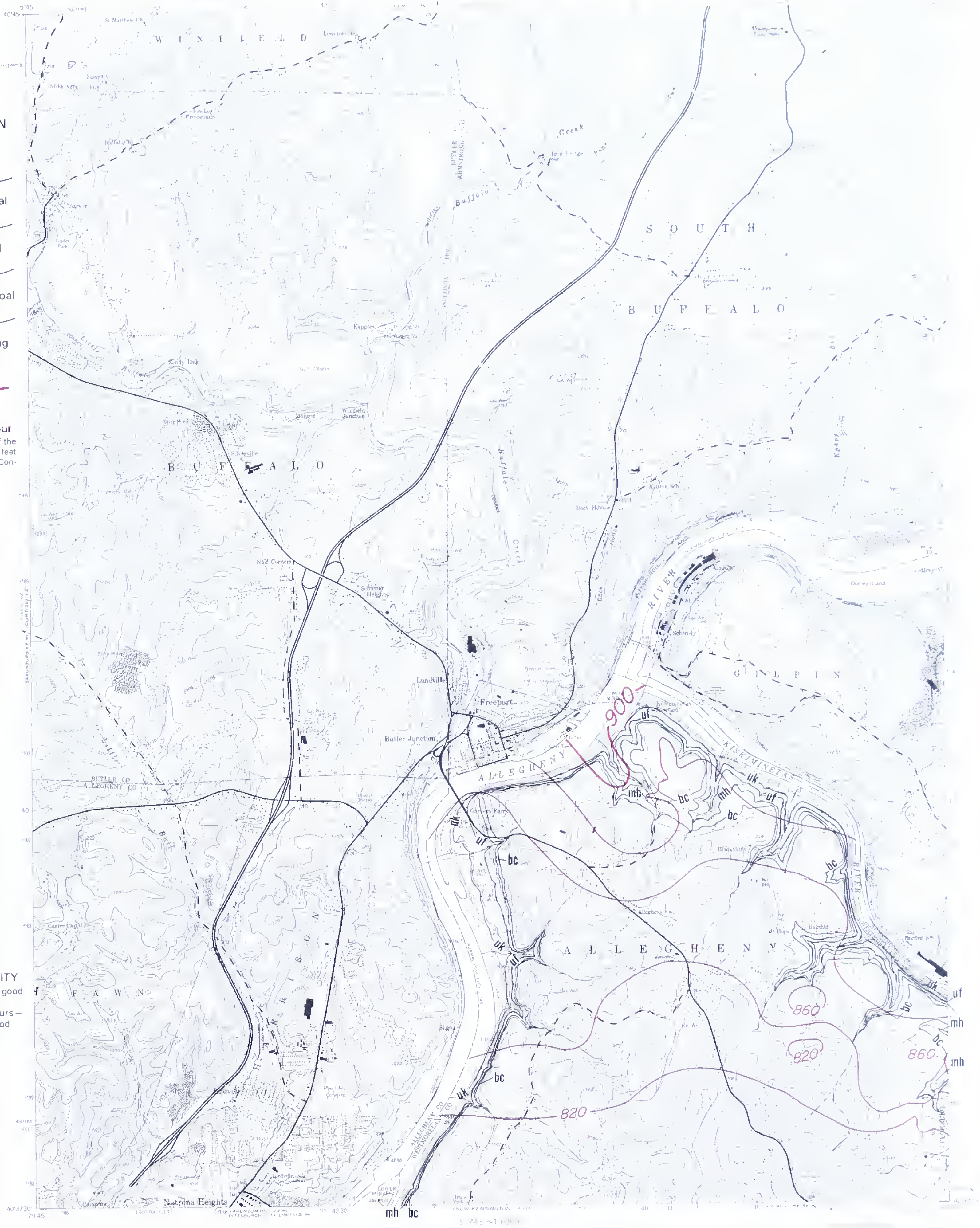
mh
Mahoning coal

uf
Upper Freeport coal

uk
Upper Kittanning coal

900
Structure contour
Altitude of the base of the Upper Freeport coal, in feet above mean sea level. Contour interval 20 feet.

MAP RELIABILITY
Coal crop lines—good to very good
Structure contours—good to very good



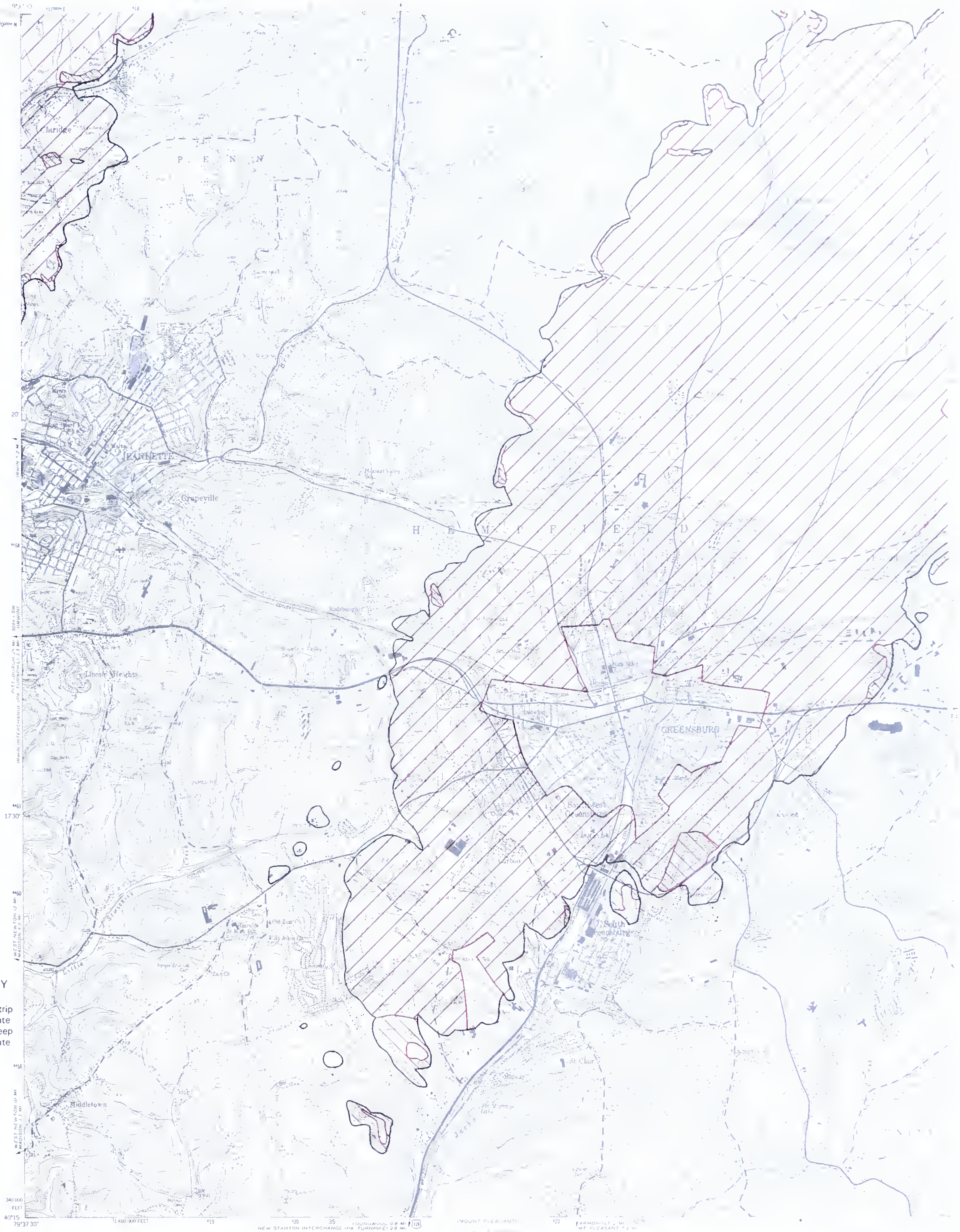
SOURCES

Crop lines by V. W. Skema based on structure contours and intervals from structure contours.
Structure contours compiled by V. W. Skema from unpublished data and contours extended from adjacent areas (Dodge, C. H., compiler (1985), *Coal resources of Allegheny County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours,* Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 89, Pt. 1, p. 32; and Bragonier, W. A. (1986), unpublished map for Freeport quadrangle, Armstrong County).

COAL CROP LINES AND STRUCTURE CONTOURS

FREEPORT

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



EXPLANATION

～ Crop line of the Pittsburgh coal

▧ Extent of known strip mining

▨ Extent of known deep mining

MAP RELIABILITY

Coal crop line—good
Limits of known strip mining—approximate
Limits of known deep mining—approximate

SOURCES

Crop line by V. W. Skema based on structure contours modified from Wagner, W. R., Heyman, L., Craft, J. L., and others (1975), *Greater Pittsburgh Region structure contour map*, Pennsylvania Geological Survey, 4th ser., Map 43, scale 1:125,000.
Limits of strip mining based on interpretation of topographic map and aerial photographs.
Limits of deep mining from unpublished mine maps.

GREENSBURG

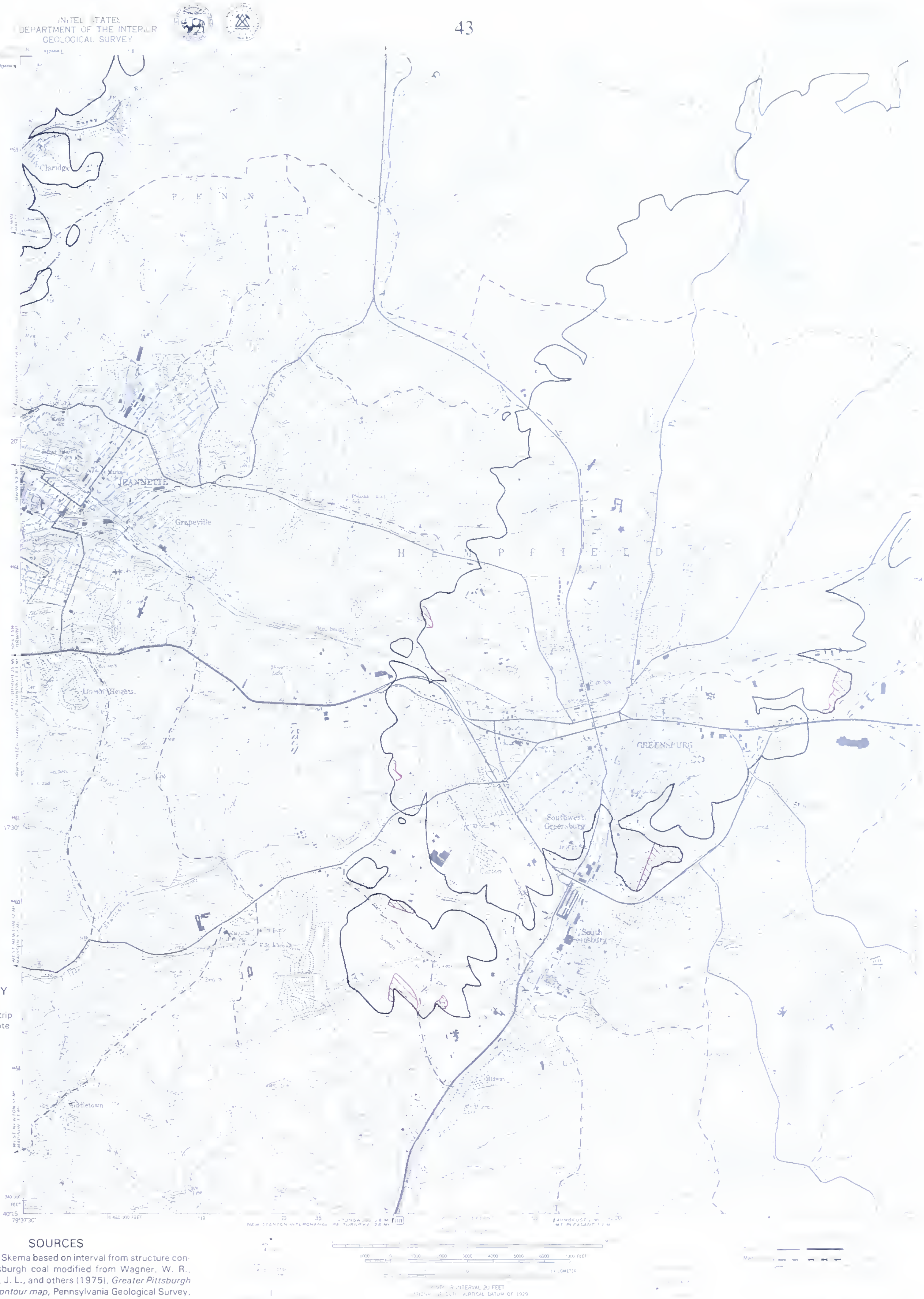
CROP LINE AND MINED-OUT AREAS OF THE

PITTSBURGH COAL

EXPLANATION

〜 Crop line of the Redstone coal

▨ Extent of known strip mining



MAP RELIABILITY
Coal crop line—good
Limits of known strip mining—approximate

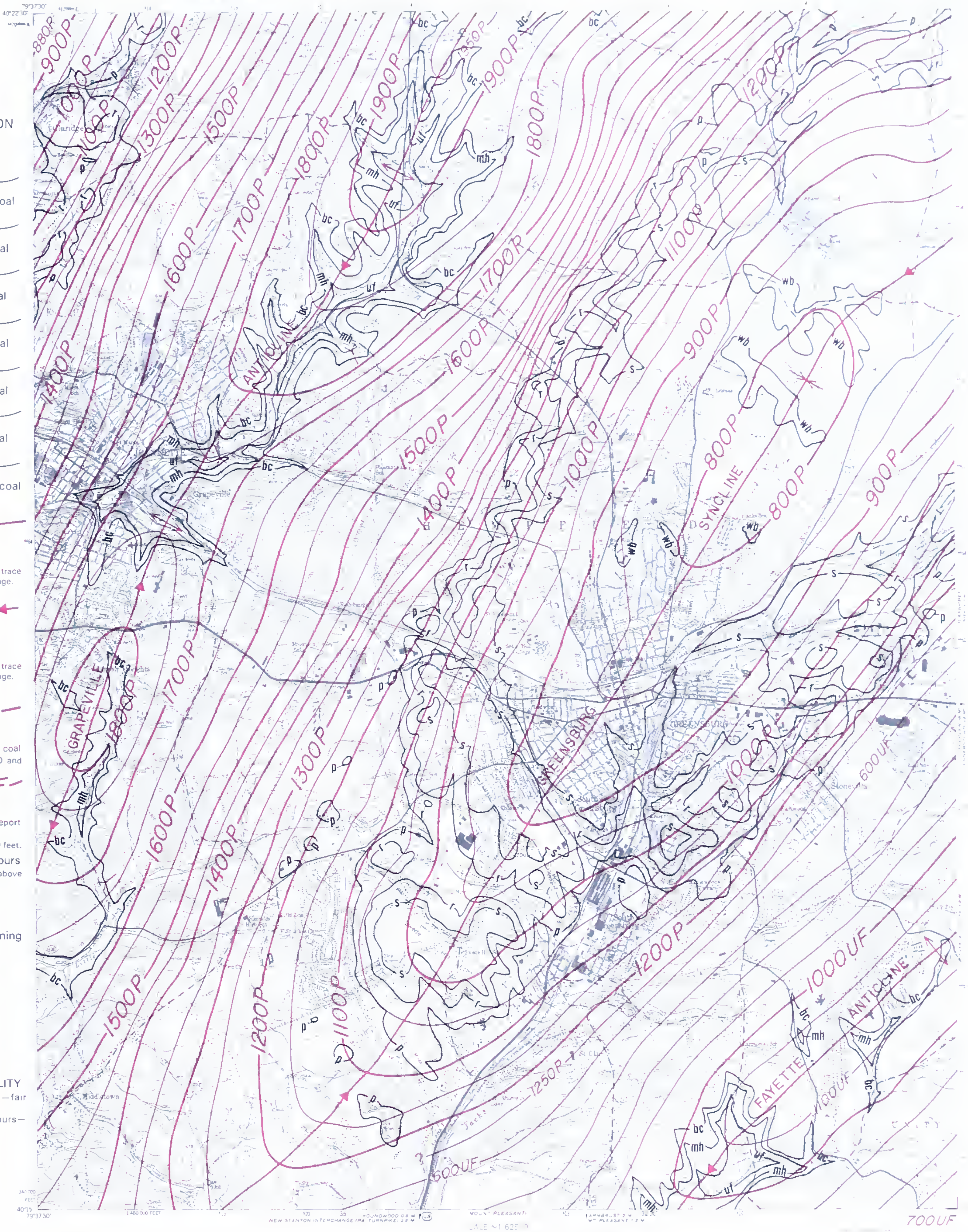
SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Pittsburgh coal modified from Wagner, W. R., Heyman, L., Craft, J. L., and others (1975), *Greater Pittsburgh Region structure contour map,* Pennsylvania Geological Survey, 4th ser., Map 43, scale 1:125,000.
Limits of strip mining based on interpretation of topographic map.

GREENSBURG

CROP LINE AND MINED-OUT AREAS OF THE
REDSTONE COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



EXPLANATION

CROP LINES

wb
Waynesburg coal

s
Sewickley coal

r
Redstone coal

p
Pittsburgh coal

bc
Brush Creek coal

mh
Mahoning coal

uf
Upper Freeport coal

Anticline
Showing axial-plane trace and direction of plunge.

Syncline
Showing axial-plane trace and direction of plunge.

800P
Base of Pittsburgh coal
Contour intervals 20 and 50 feet.

1000UF
Base of Upper Freeport coal
Contour interval 100 feet.

Structure contours
Altitudes in feet above mean sea level.

Deep-mine opening

MAP RELIABILITY

Coal crop lines—fair to good
Structure contours—fair to good

SOURCES

Crop lines by V. W. Skema based on structure contours and intervals from structure contours.
Structure contours on the Pittsburgh coal modified by V. W. Skema from Wagner, W. R., Heyman, L., Craft, J. L., and others (1975), *Greater Pittsburgh Region structure contour map*, Pennsylvania Geological Survey, 4th ser., Map 43, scale 1:125,000.
Structure contours on the Upper Freeport coal compiled by V. W. Skema from unpublished data.
Locations of deep-mine openings from Johnson, M. E. (1925), *Mineral resources of the Greensburg quadrangle, Westmoreland County, Pennsylvania*, Pennsylvania Geological Survey, 4th ser., Atlas 37, 162 p.

COAL CROP LINES AND STRUCTURE CONTOURS

GREENSBURG

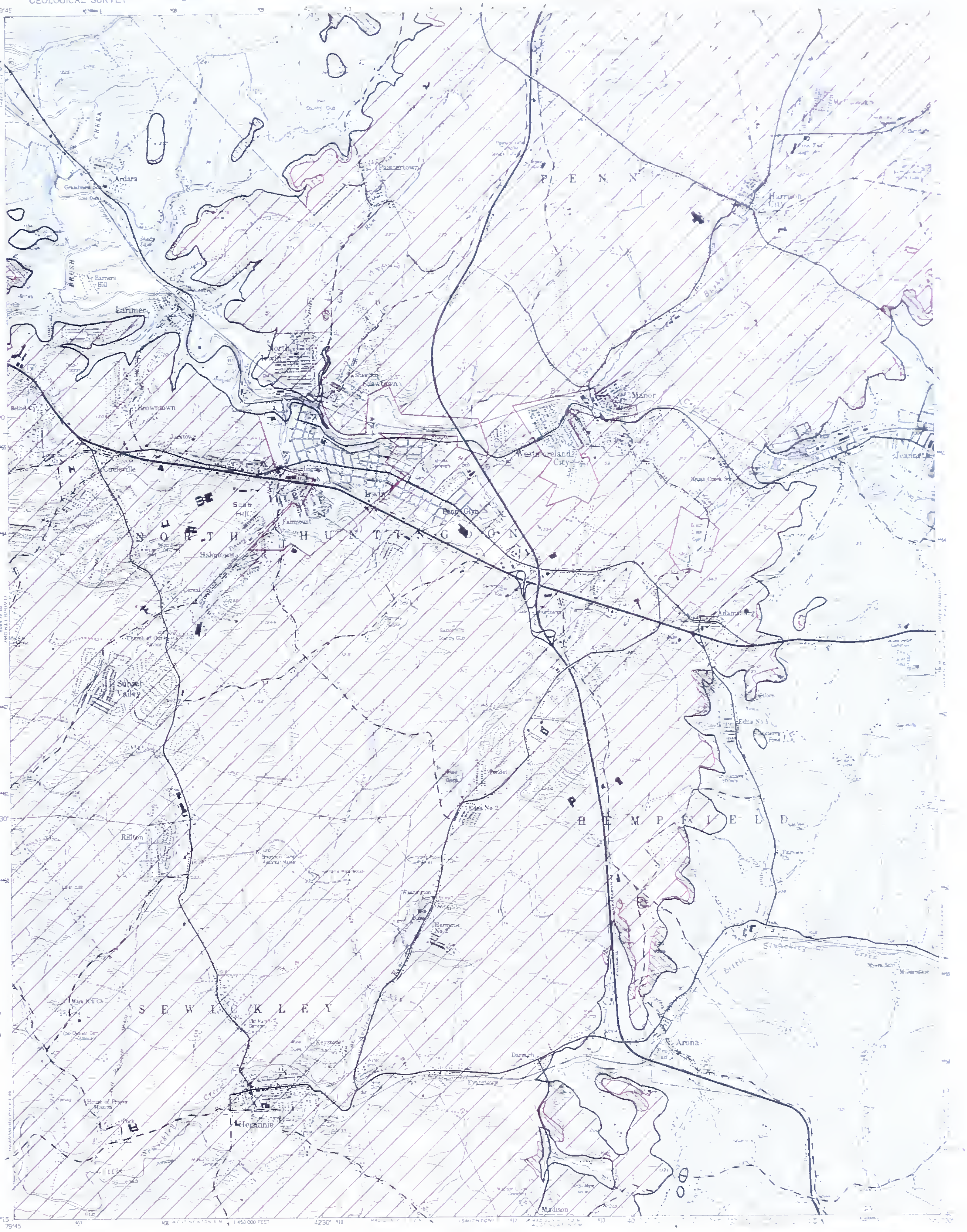
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

〜 Crop line of the Pittsburgh coal

▨ Extent of known strip mining

▨ Extent of known deep mining



MAP RELIABILITY

Coal crop line—good
Limits of known strip mining—approximate
Limits of known deep mining—approximate

SOURCES

Crop line by V. W. Skema based on structure contours compiled from unpublished mine maps and modified from Johnson, M. E (1925), *Mineral resources of the Greensburg quadrangle, Westmoreland County, Pennsylvania*, Pennsylvania Geological Survey, 4th ser., Atlas 37, 162 p.

Limits of strip mining based on interpretation of topographic map.

Limits of deep mining from unpublished mine maps and from Pennsylvania Department of Environmental Resources, Bureau of Mining and Reclamation (1978), unpublished map.

IRWIN

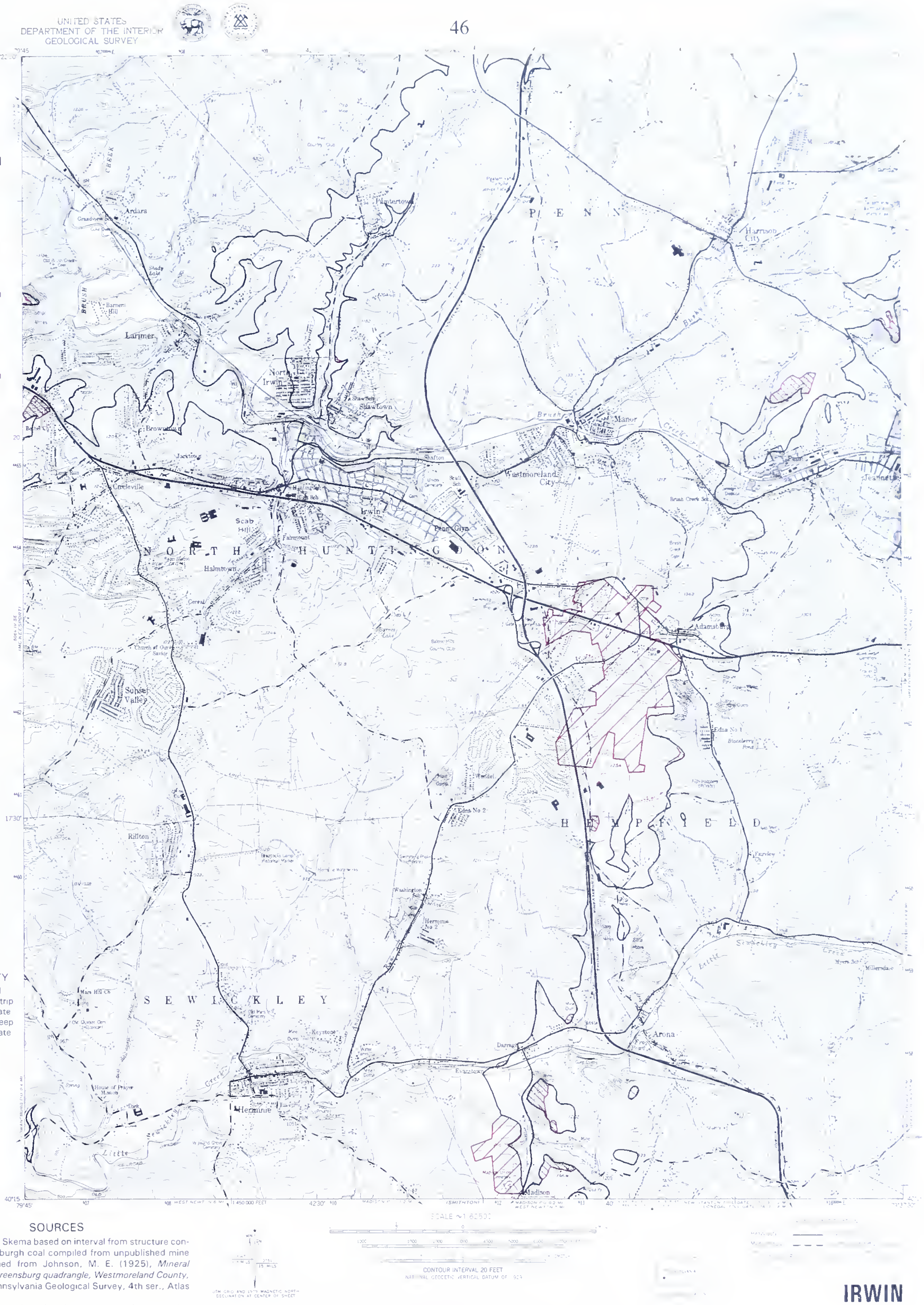
CROP LINE AND MINED-OUT AREAS OF THE
PITTSBURGH COAL

EXPLANATION

~ Crop line of the Redstone coal

▨ Extent of known strip mining

▧ Extent of known deep mining



MAP RELIABILITY

Coal crop line—good
Limits of known strip mining—approximate
Limits of known deep mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Pittsburgh coal compiled from unpublished mine maps and modified from Johnson, M. E. (1925), *Mineral resources of the Greensburg quadrangle, Westmoreland County, Pennsylvania*, Pennsylvania Geological Survey, 4th ser., Atlas 37, 162 p.

Limits of strip mining based on interpretation of topographic map.

Limits of deep mining from unpublished mine maps

IRWIN

CROP LINE AND MINED-OUT AREAS OF THE
REDSTONE COAL

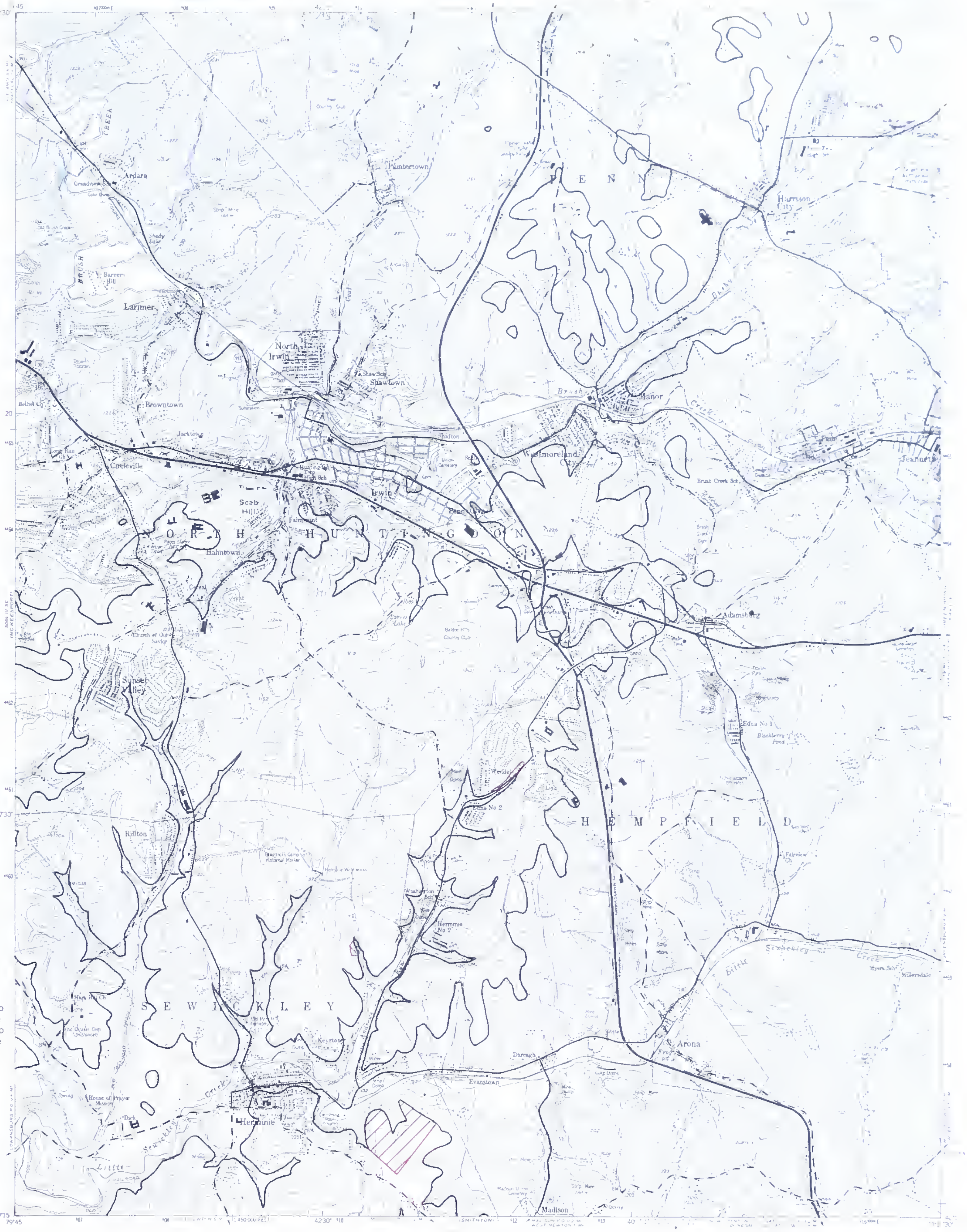
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

∼ Crop line of the Waynesburg coal

▨ Extent of known strip mining

▨ Extent of known deep mining



SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Pittsburgh coal compiled from unpublished mine maps and modified from Johnson, M. E. (1925), *Mineral resources of the Greensburg quadrangle, Westmoreland County, Pennsylvania*, Pennsylvania Geological Survey, 4th ser., Atlas 37, 162 p.

Limits of strip mining based on interpretation of topographic map.

Limits of deep mining from unpublished mine maps.

MAP RELIABILITY

Coal crop line—good
Limits of known strip mining—approximate
Limits of known deep mining—approximate

CROP LINE AND MINED-OUT AREAS OF THE
WAYNESBURG COAL

IRWIN

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

CROP LINES

— w — Washington coal

— wb — Waynesburg coal

— r — Redstone coal

— p — Pittsburgh coal

— bc — Brush Creek coal

Anticline
Showing axial-plane trace and direction of plunge

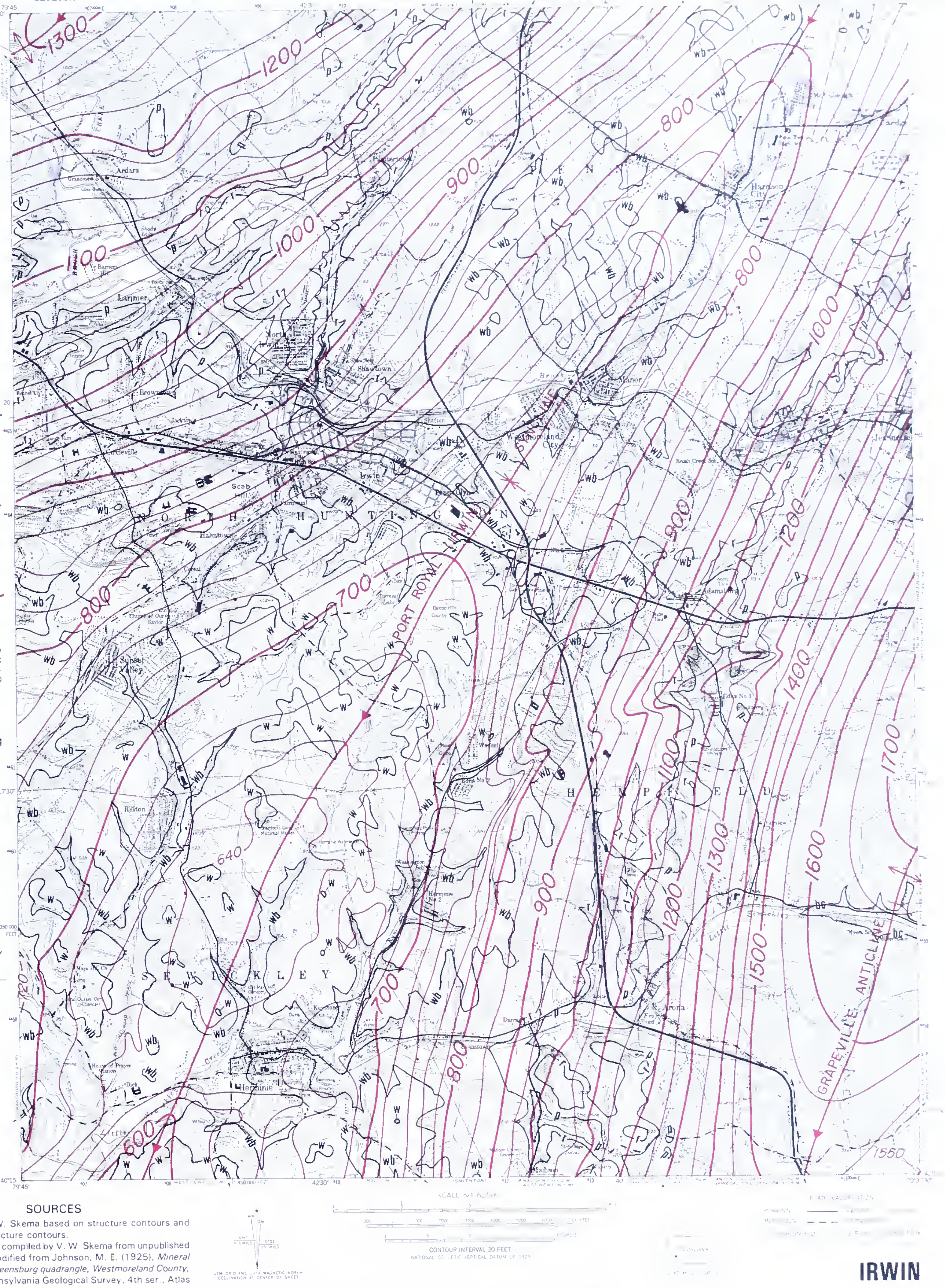
Syncline
Showing axial-plane trace and direction of plunge

— 800 —
Structure contour
Altitude of the base of the Pittsburgh coal, in feet above mean sea level. Contour intervals 20 and 50 feet

Deep-mine opening

MAP RELIABILITY

Coal crop lines—good
Structure contours—good



SOURCES

Crop lines by V. W. Skema based on structure contours and intervals from structure contours.

Structure contours compiled by V. W Skema from unpublished mine maps and modified from Johnson, M. E. (1925), *Mineral resources of the Greensburg quadrangle, Westmoreland County, Pennsylvania*, Pennsylvania Geological Survey, 4th ser., Atlas 37, 162 p.

Location of deep-mine opening from Johnson (1925).

IRWIN

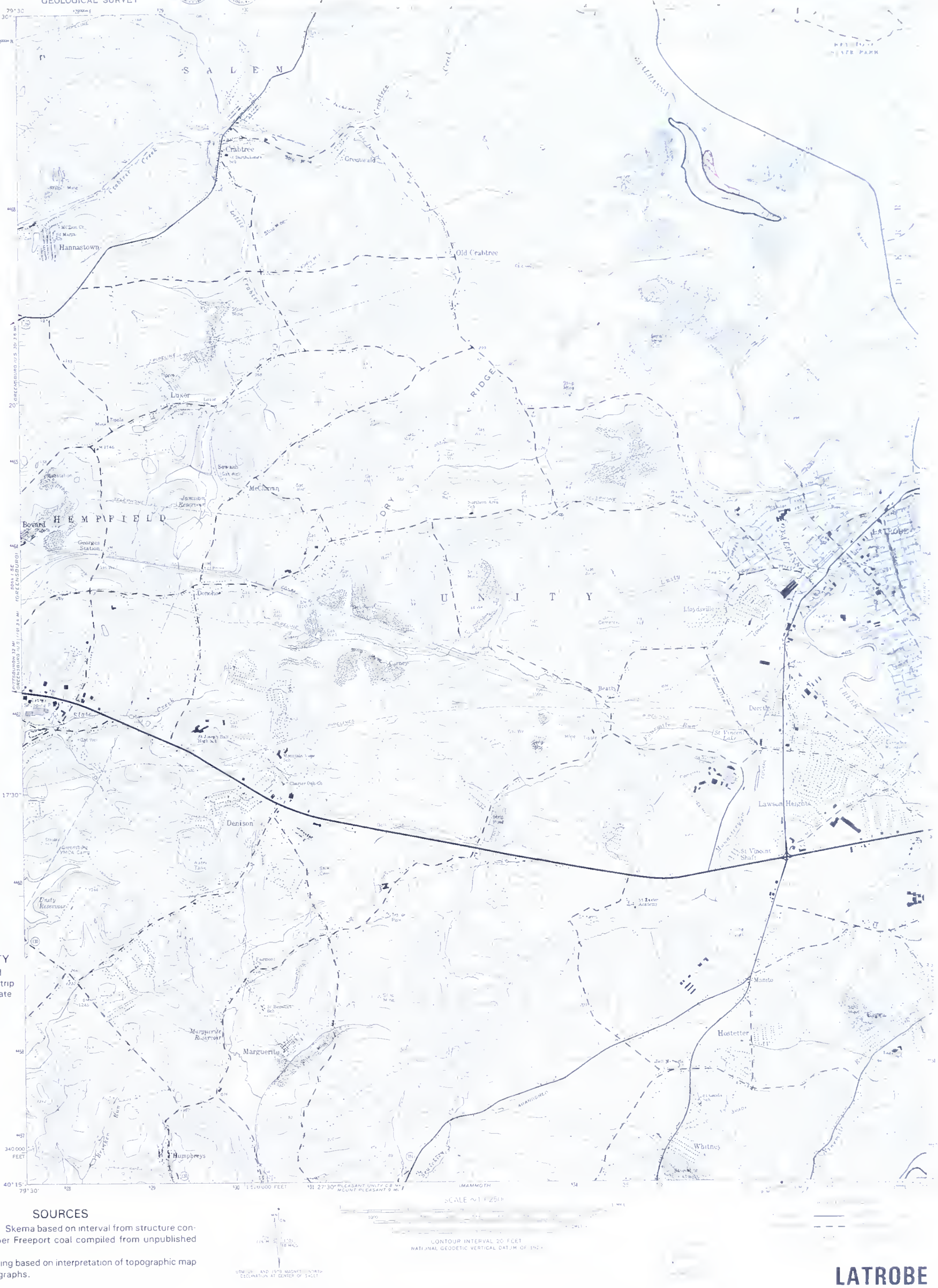
COAL CROP LINES AND STRUCTURE CONTOURS

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

〜 Crop line of the Middle Kittanning coal

▨ Extent of known strip mining



MAP RELIABILITY

Coal crop line—good
Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Upper Freeport coal compiled from unpublished data

Limits of strip mining based on interpretation of topographic map and aerial photographs.

LATROBE

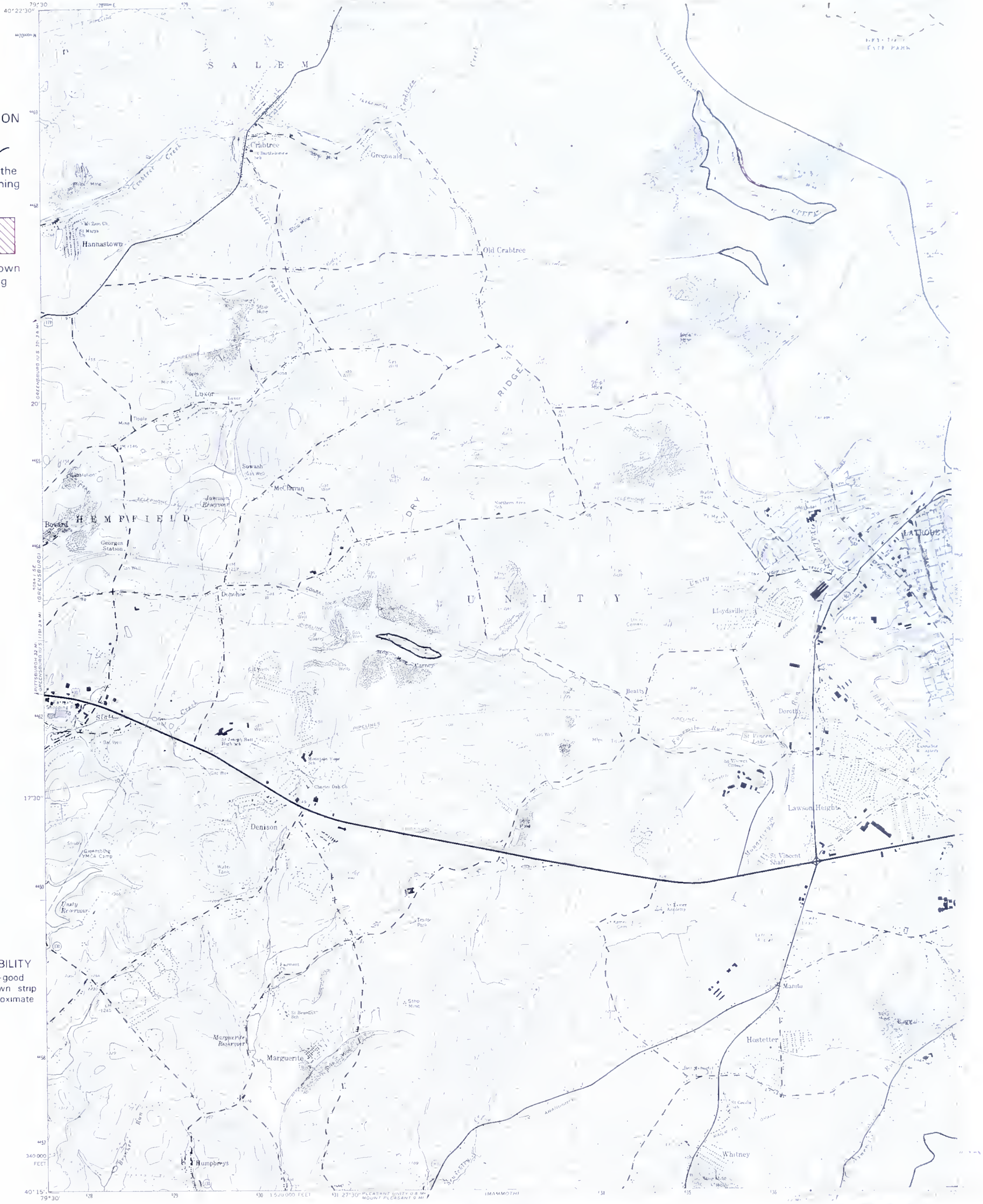
CROP LINE AND MINED-OUT AREA OF THE
MIDDLE KITTANNING COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

〰 Crop line of the Upper Kittanning coal

▨ Extent of known strip mining



MAP RELIABILITY

Coal crop line—good
Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Upper Freeport coal compiled from unpublished data.

Limits of strip mining based on interpretation of topographic map and aerial photographs

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

UTM GRID AND 1979 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

LATROBE

CROP LINE AND MINED-OUT AREA OF THE
UPPER KITTANNING COAL

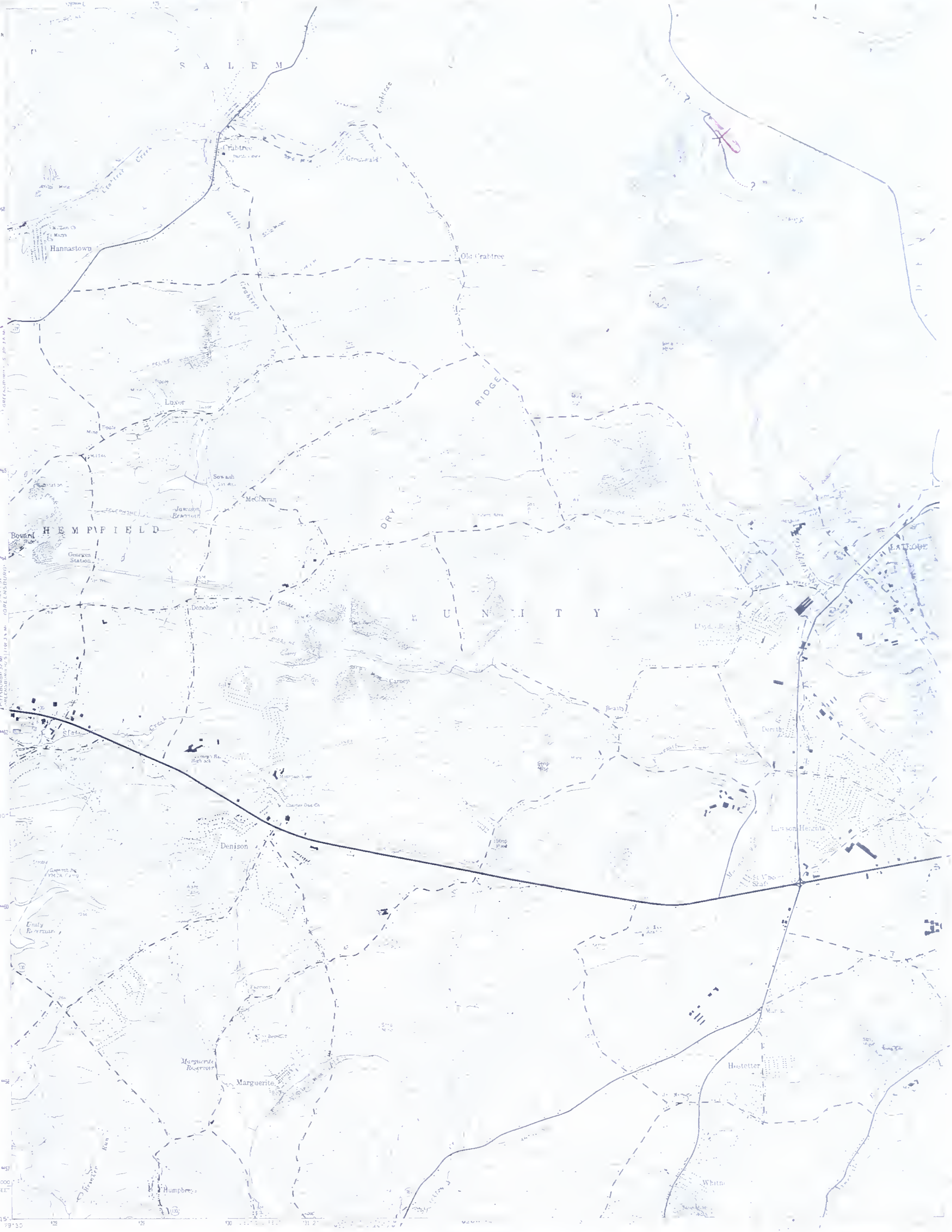
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

〰 Crop line of the Lower Freeport coal

▨ Extent of known strip mining

Y Deep-mine opening



MAP RELIABILITY

Coal crop line—good
Limits of known strip mining—approximate

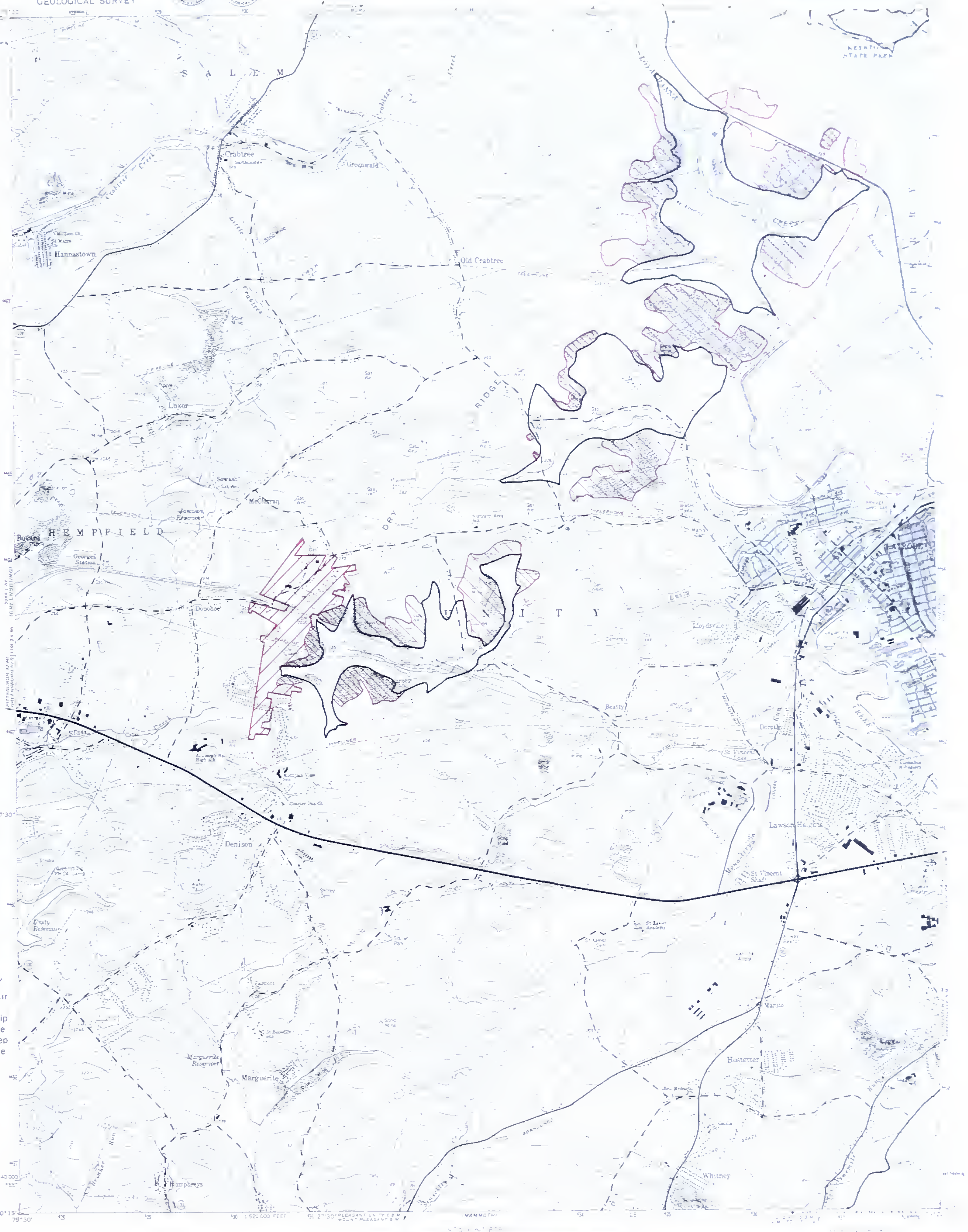
SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Upper Freeport coal compiled from unpublished data.
Limits of strip mining based on interpretation of topographic map and aerial photographs.
Location of deep-mine opening from field checking

LATROBE

CROP LINE AND MINED-OUT AREAS OF THE
LOWER FREEPORT COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



EXPLANATION

〜 Crop line of the Upper Freeport coal

▨ Extent of known strip mining

▨ Extent of known deep mining

MAP RELIABILITY

Coal crop line—fair to very good
Limits of known strip mining—approximate
Limits of known deep mining—approximate

SOURCES

Crop line by V. W. Skema based on structure contours compiled from unpublished data.
Limits of strip mining based on interpretation of topographic map and aerial photographs.
Limits of deep mining from unpublished mine maps.

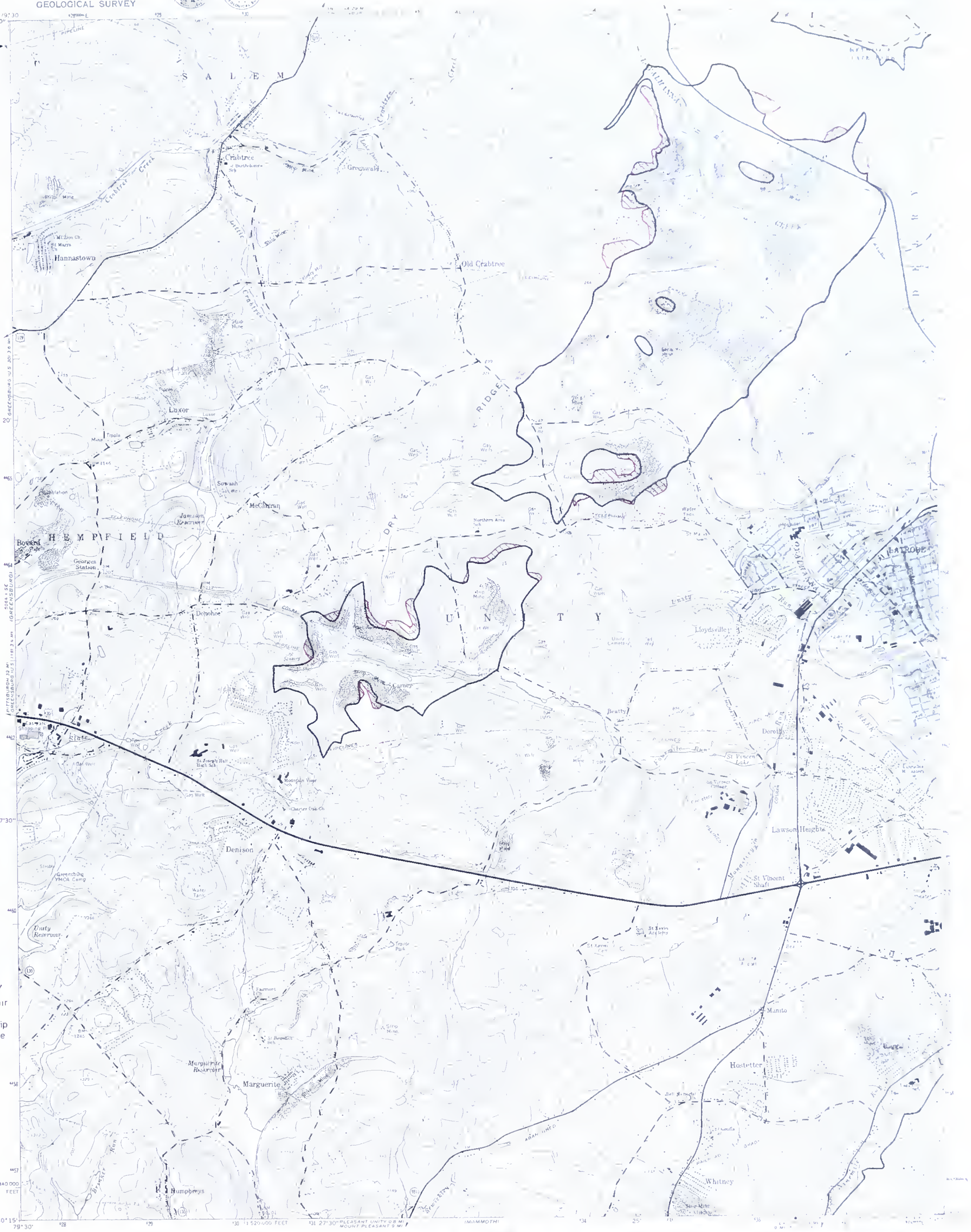
LATROBE

CROP LINE AND MINED-OUT AREAS OF THE
UPPER FREEPORT COAL

EXPLANATION

〰 Crop line of the Mahoning coal

▨ Extent of known strip mining



MAP RELIABILITY
Coal crop line—fair to good
Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Upper Freeport coal compiled from unpublished data
Limits of strip mining based on interpretation of topographic map and aerial photographs.

LATROBE

CROP LINE AND MINED-OUT AREAS OF THE
MAHONING COAL

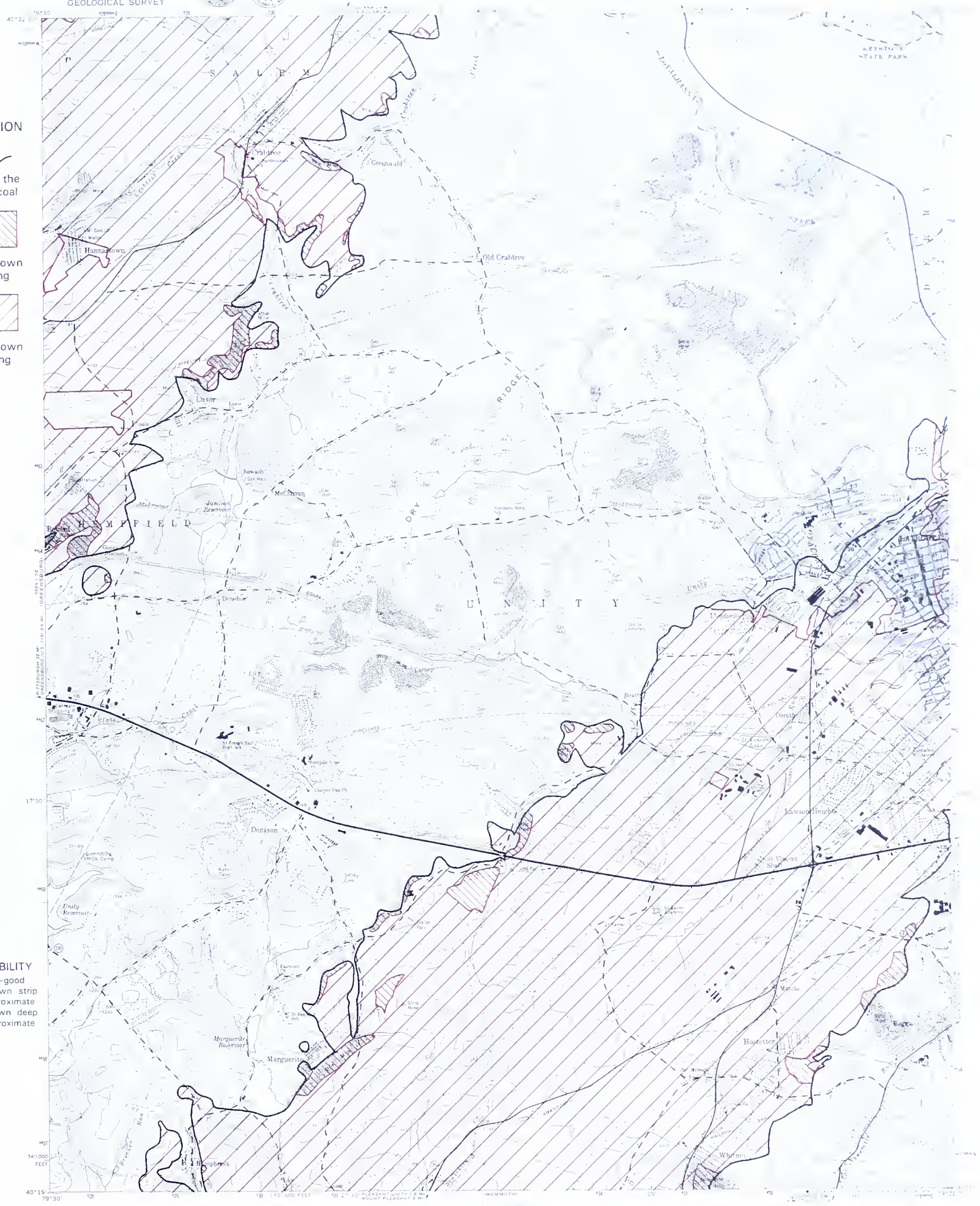
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

～ Crop line of the Pittsburgh coal

▨ Extent of known strip mining

▨ Extent of known deep mining



MAP RELIABILITY
Coal crop line—good
Limits of known strip mining—approximate
Limits of known deep mining—approximate

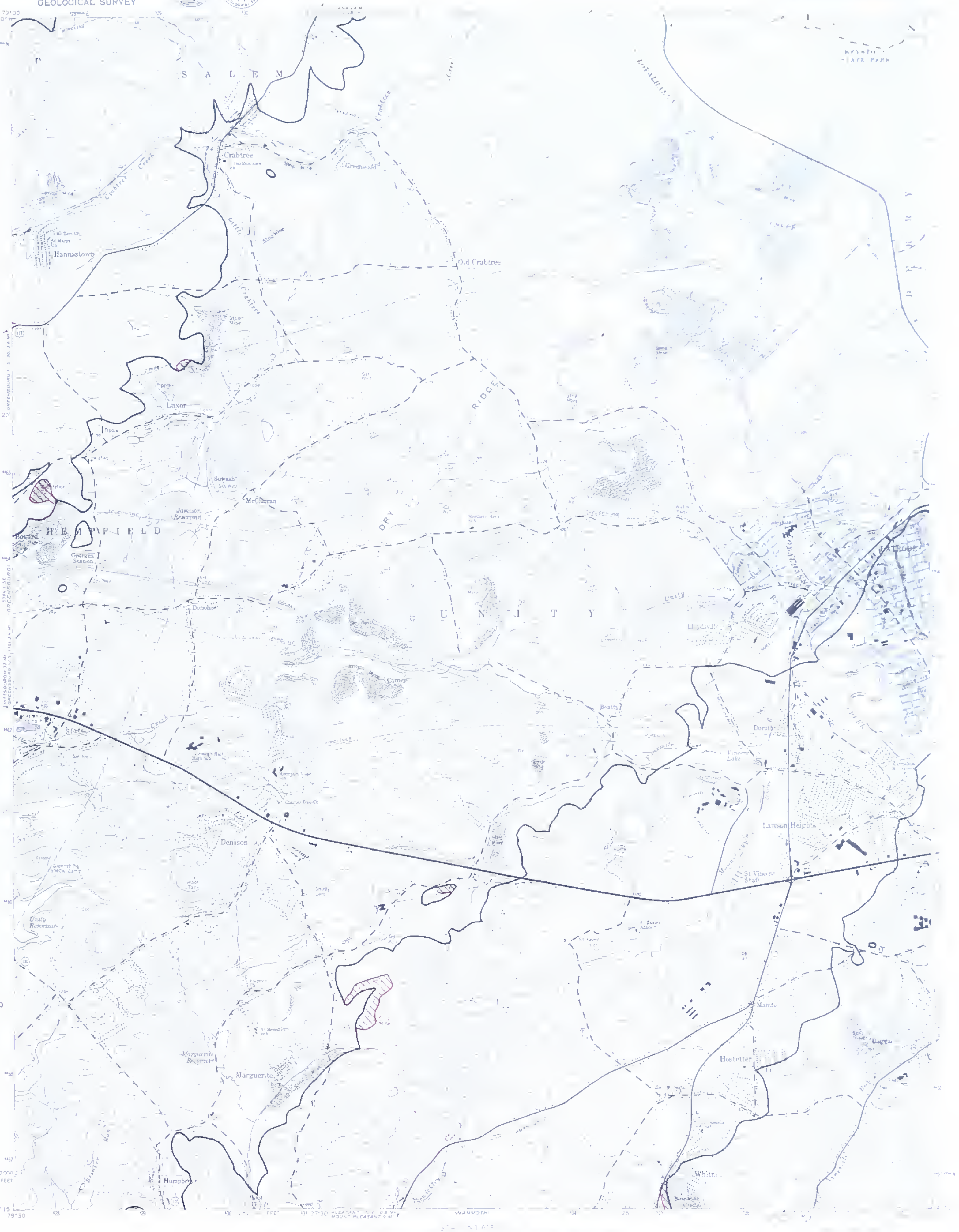
SOURCES
Crop line by V. W. Skema based on structure contours modified from unpublished data.
Limits of strip mining based on interpretation of topographic map and aerial photographs.
Limits of deep mining from unpublished mine maps

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

LATROBE

CROP LINE AND MINED-OUT AREAS OF THE
PITTSBURGH COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



EXPLANATION

〰 Crop line of the Redstone coal

▨ Extent of known strip mining

MAP RELIABILITY

Coal crop line—good
Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Pittsburgh coal modified from unpublished data. Limits of strip mining based on interpretation of topographic map and aerial photographs.

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

LATROBE

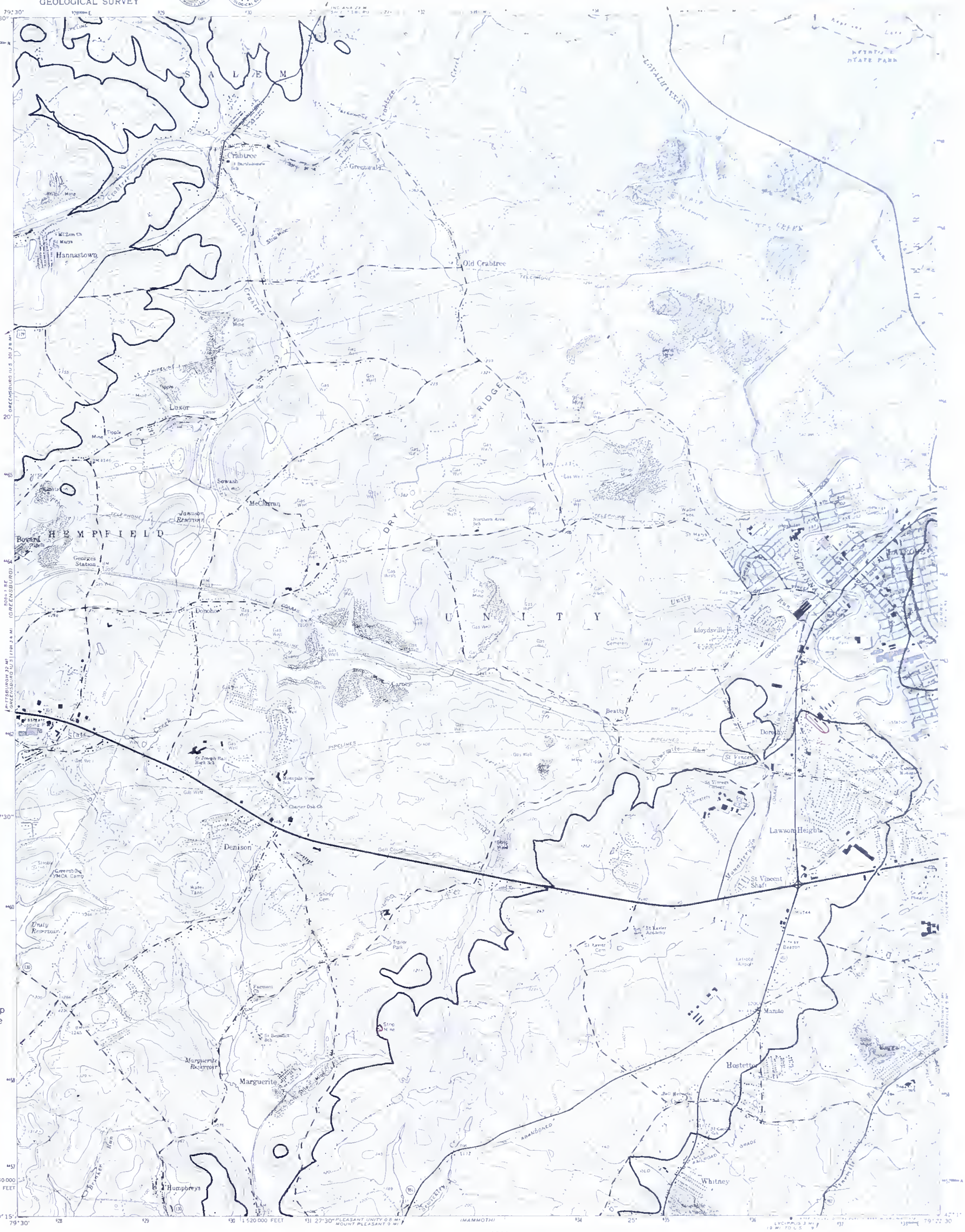
CROP LINE AND MINED-OUT AREAS OF THE

REDSTONE COAL

EXPLANATION

Crop line of the Sewickley coal

▨ Extent of known strip mining



MAP RELIABILITY

Coal crop line—good
Limits of known strip mining—approximate

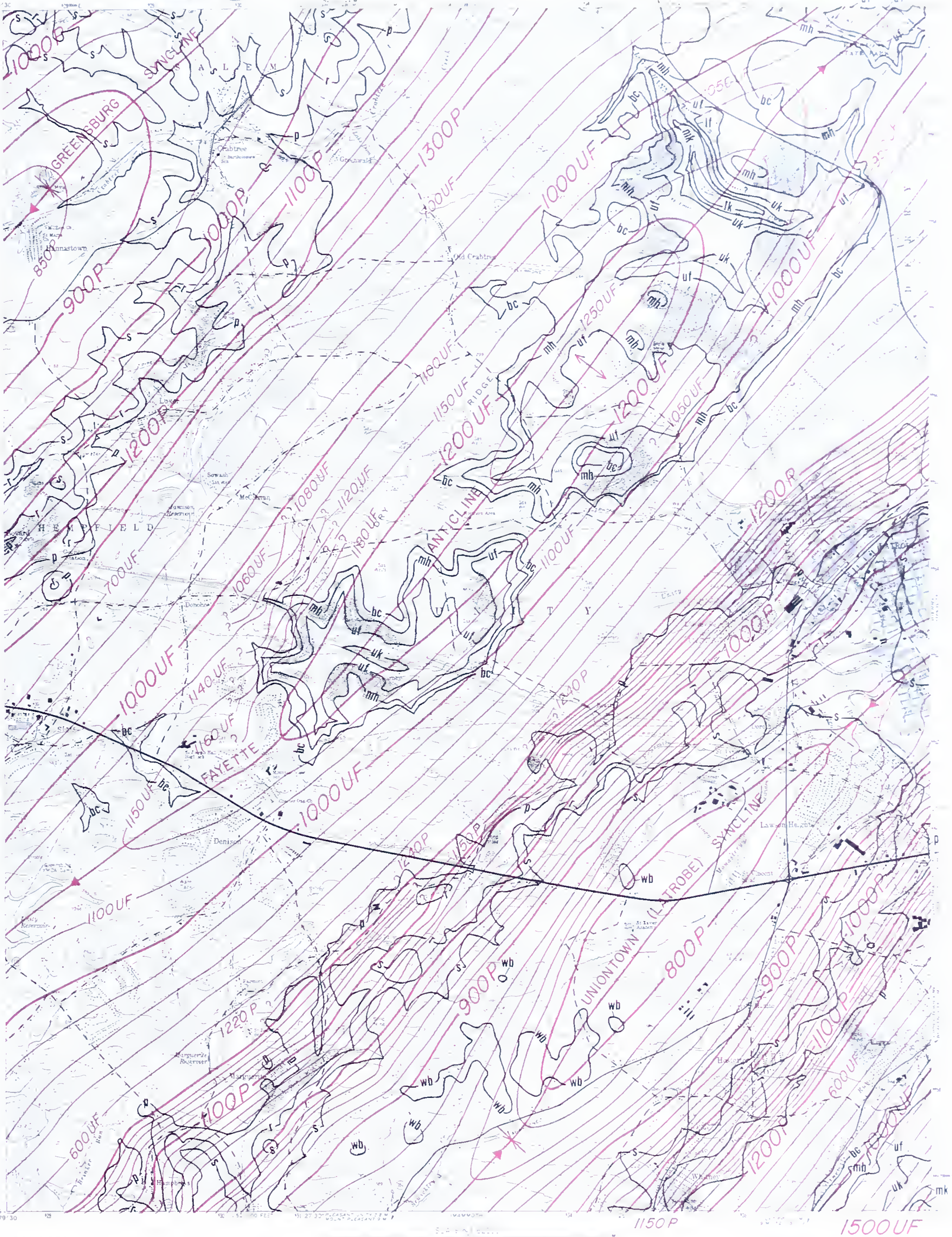
SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Pittsburgh coal modified from unpublished data. Limits of strip mining based on interpretation of topographic map.

LATROBE

CROP LINE AND MINED-OUT AREAS OF THE SEWICKLEY COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



EXPLANATION

CROP LINES

—wb— Waynesburg coal

—s— Sewickley coal

—r— Redstone coal

—p— Pittsburgh coal

—bc— Brush Creek coal

—mh— Mahoning coal

—uf— Upper Freeport coal

—lf— Lower Freeport coal

—uk— Upper Kittanning coal

—mk— Middle Kittanning coal

—lk— Lower Kittanning coal

Anticline
Showing axial-plane trace and direction of plunge.

Syncline
Showing axial-plane trace and direction of plunge.

—900P— Base of Pittsburgh coal
Contour intervals 20 and 50 feet.

—1000UF— Base of Upper Freeport coal
Contour intervals 20, 50, 60, and 100 feet

Structure contours
Altitudes in feet above mean sea level.

MAP RELIABILITY
Coal crop lines—fair to very good
Structure contours—fair to very good

SOURCES

Crop lines by V. W. Skema based on structure contours and intervals from structure contours.
Structure contours on the Pittsburgh coal modified by V. W. Skema from unpublished data. Structure contours on the Upper Freeport coal compiled by V. W. Skema from unpublished data.

LATROBE

COAL CROP LINES AND STRUCTURE CONTOURS

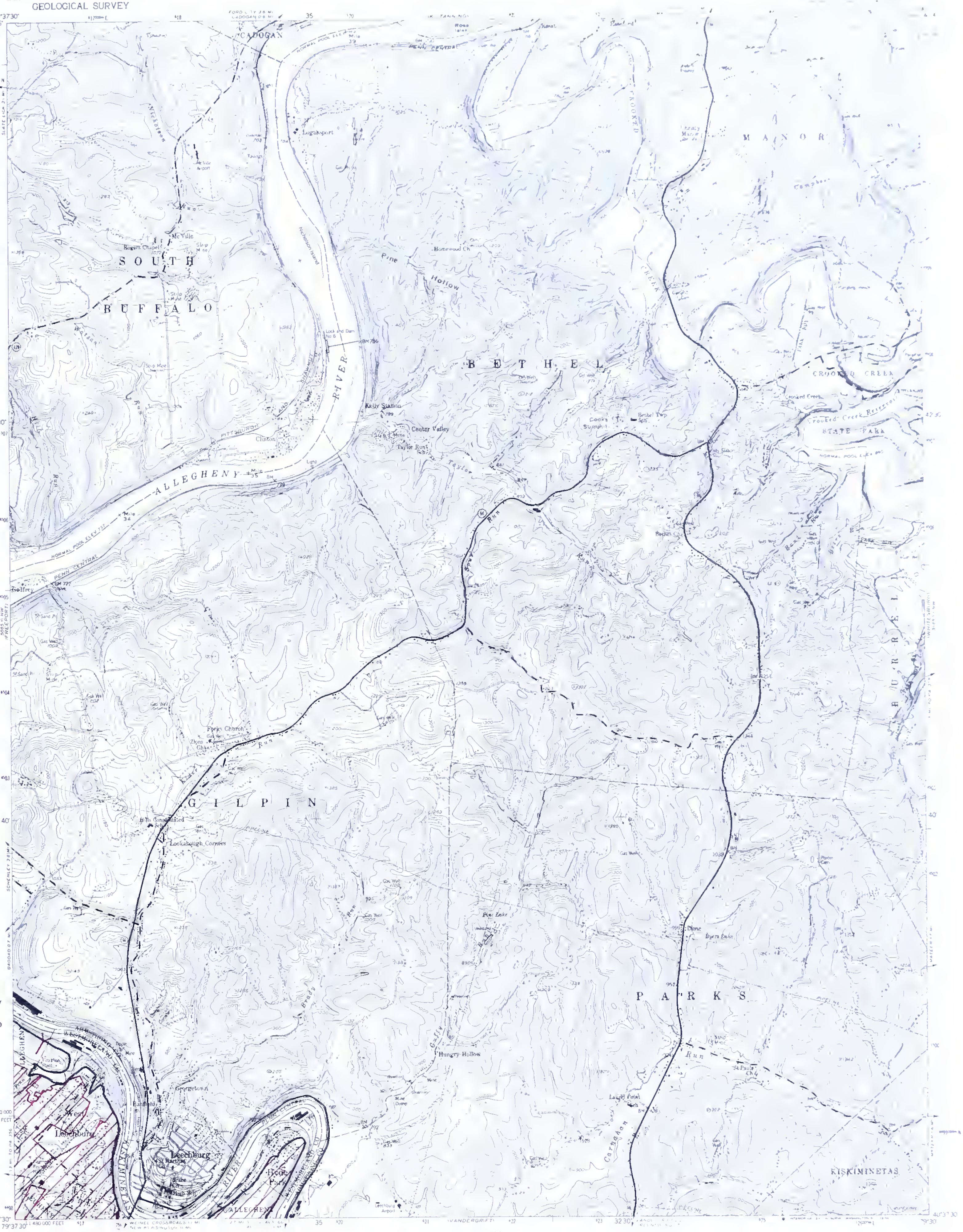
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

Crop line of the Upper Freeport coal

▨ Extent of known deep mining

Y Deep-mine opening



MAP RELIABILITY

Coal crop line—very good

Limits of known deep mining—approximate

SOURCES

Crop line by V. W. Skema based on structure contours compiled from unpublished data.

Limits of deep mining from unpublished mine maps.

Location of deep-mine opening from Hughes, H. H. (1933), *Freeport quadrangle—Geology and mineral resources*, Pennsylvania Geological Survey, 4th ser., Atlas 36, 272 p.

UTM GRID AND 1965 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:62500

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

PENNSYLVANIA
QUADRANGLE LOCATION

ROAD CLASSIFICATION
Heavy duty — Light duty
Medium duty — Unimproved
State Route

LEECHBURG

CROP LINE AND MINED-OUT AREAS OF THE
UPPER FREEPORT COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

CROP LINES

bc
Brush Creek coal

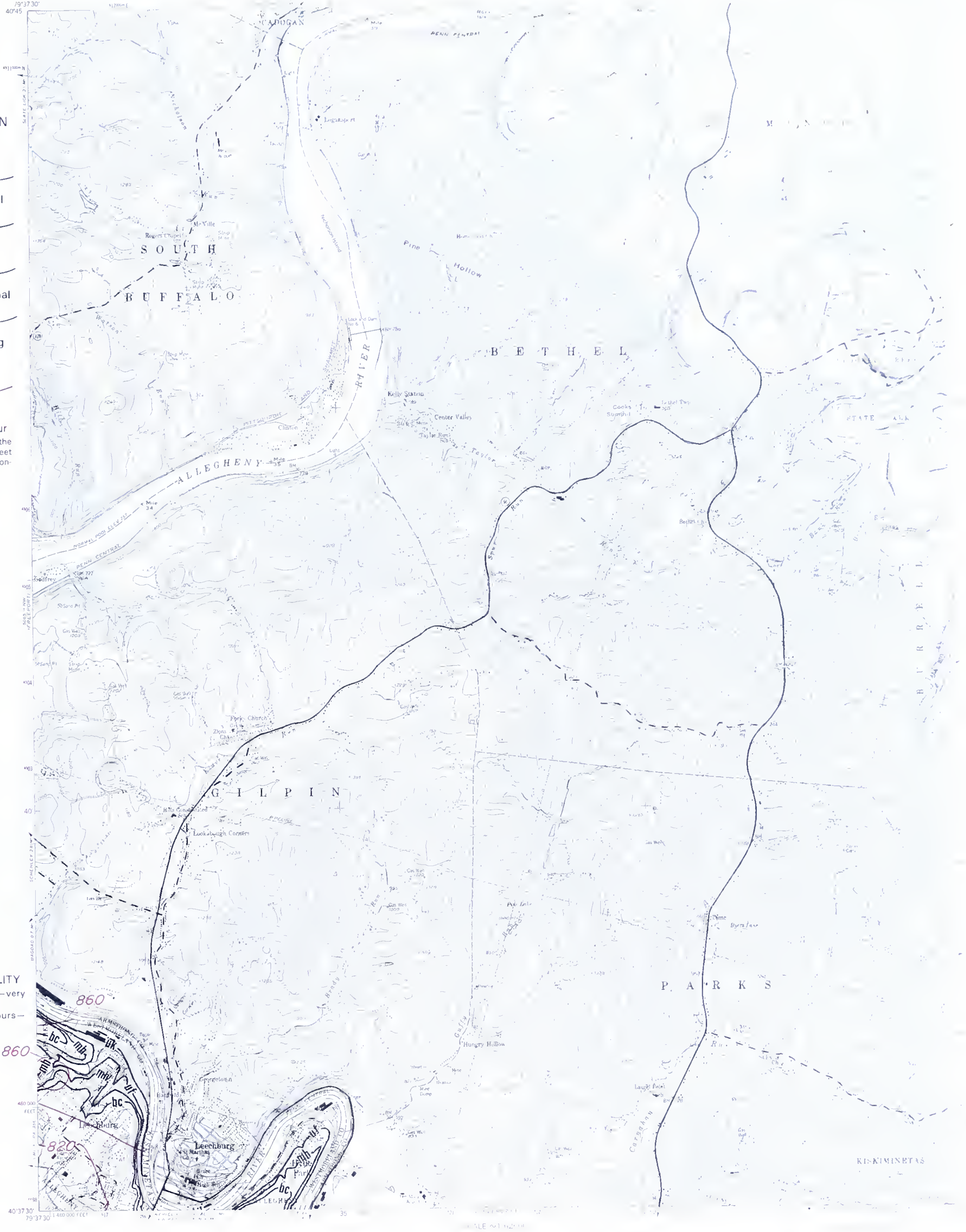
mh
Mahoning coal

uf
Upper Freeport coal

uk
Upper Kittanning coal

860
Structure contour
Altitude of the base of the Upper Freeport coal, in feet above mean sea level. Contour interval 20 feet.

MAP RELIABILITY
Coal crop lines—very good
Structure contours—very good



SOURCES
Crop lines by V. W. Skema based on structure contours and intervals from structure contours.
Structure contours compiled by V. W. Skema from unpublished data.

LEECHBURG

COAL CROP LINES AND STRUCTURE CONTOURS

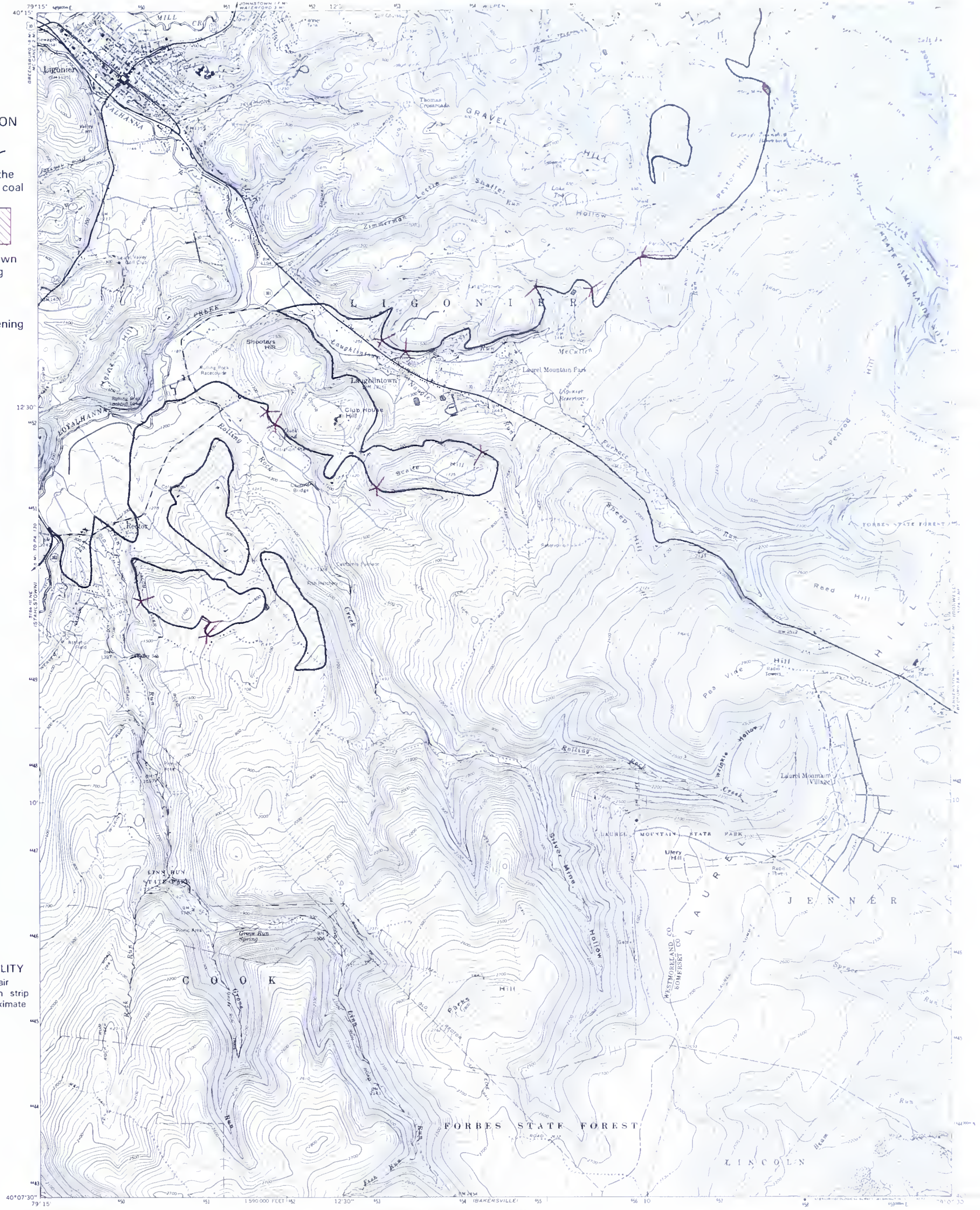
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

Crop line of the Upper Freeport coal

▨ Extent of known strip mining

Y Deep-mine opening



MAP RELIABILITY

Coal crop line—fair
Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on structure contours modified from Richardson, G. B. (1934), *Somerset-Windber folio, Pennsylvania*, U.S. Geological Survey Geologic Atlas of the U.S., Folio 224, 14 p.

Limits of strip mining based on interpretation of topographic map.

Locations of deep-mine openings from Richardson (1934).

LIGONIER

CROP LINE AND MINED-OUT AREAS OF THE
UPPER FREEPORT COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

CROP LINES

- bc — Brush Creek coal
- mh — Mahoning coal
- uf — Upper Freeport coal
- uk — Upper Kittanning coal
- mk — Middle Kittanning coal
- lk — Lower Kittanning coal
- cl — Clarion coal
- bk — Brookville coal
- mr — Mercer coal

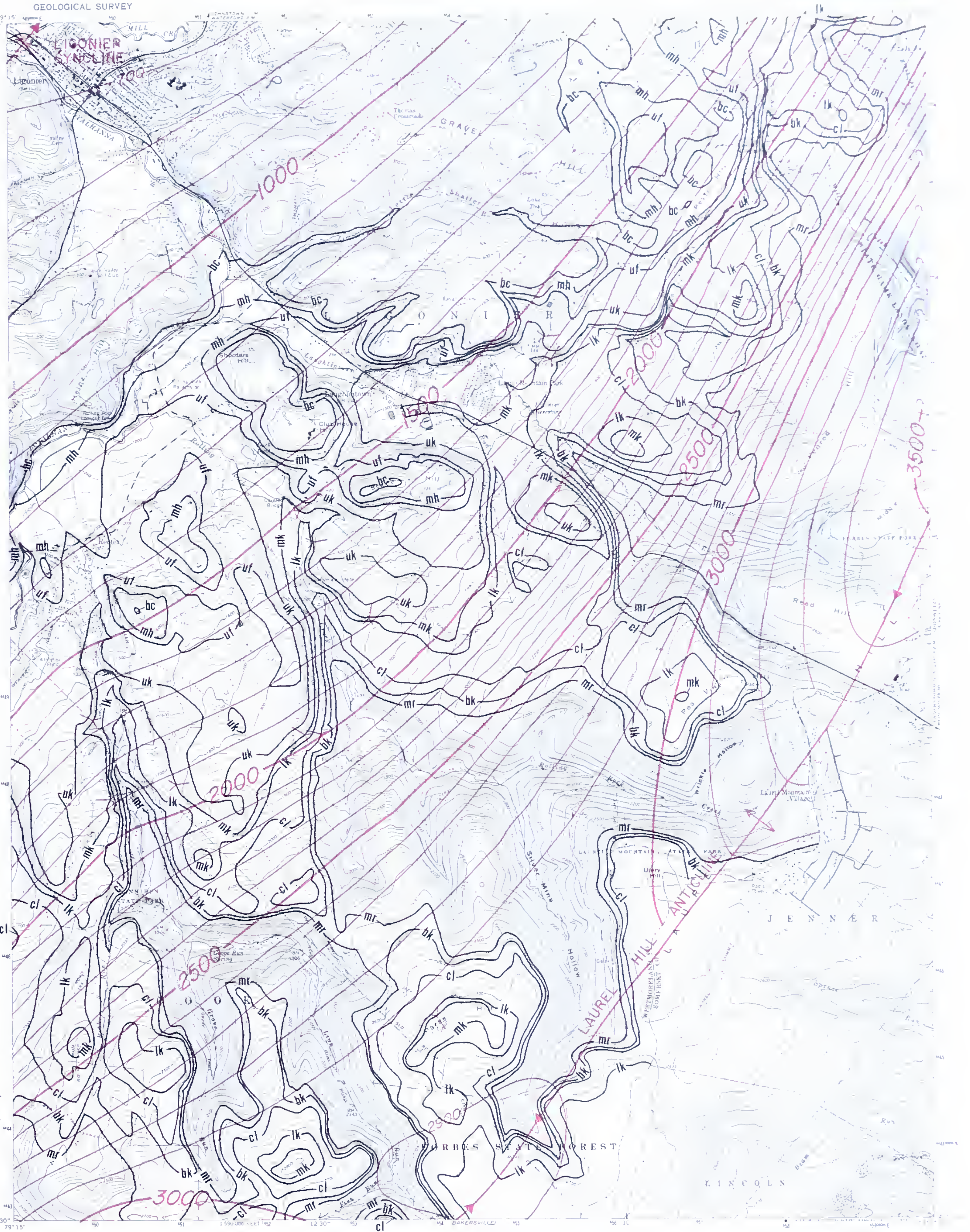
Anticline
Showing axial-plane trace and direction of plunge

Syncline
Showing axial-plane trace and direction of plunge.

2000
Structure contour
Altitude of the base of the Upper Freeport coal, in feet above mean sea level. Contour interval 100 feet.

Deep-mine opening

MAP RELIABILITY
Coal crop lines—poor to fair
Structure contours—poor to fair



SOURCES

Crop lines by V. W. Skema based on structure contours and intervals from structure contours.
Structure contours modified by V. W. Skema from Richardson, G. B. (1934), *Somerset-Windber folio, Pennsylvania,* U.S. Geological Survey Geologic Atlas of the U.S., Folio 224, 14 p.
Locations of deep-mine openings from Richardson (1934).

SCALE 1:62500

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

LIGONIER

COAL CROP LINES AND STRUCTURE CONTOURS

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

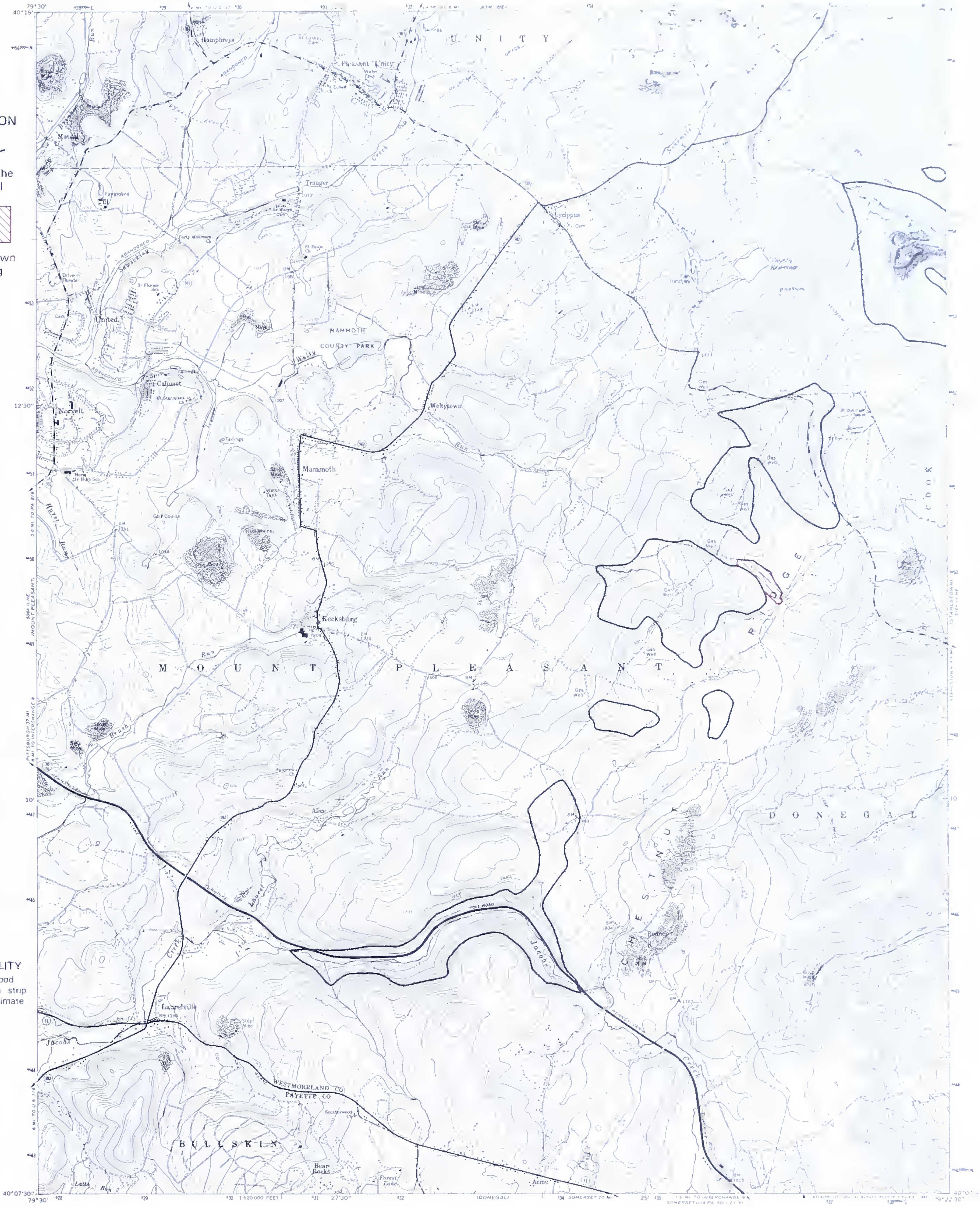
EXPLANATION

Crop line of the Mercer coal

▨ Extent of known strip mining

MAP RELIABILITY

Coal crop line—good
Limits of known strip mining—approximate

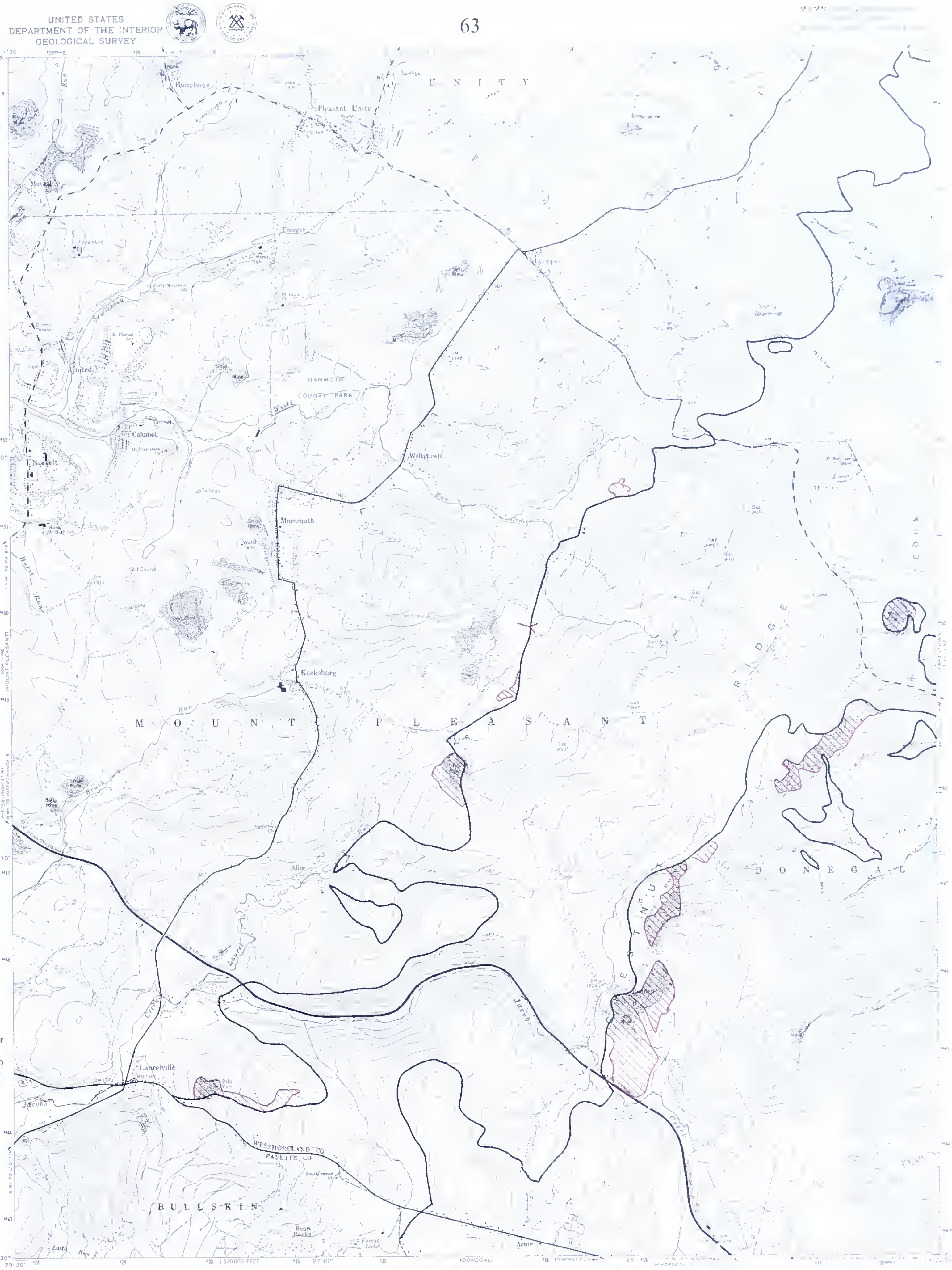


SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Upper Freeport coal compiled from unpublished data and extended from adjacent area (Shaulis, J. R., compiler (1985), *Coal resources of Fayette County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 91, Pt. 1, p. 47).
Limits of strip mining based on interpretation of aerial photographs.

MAMMOTH

CROP LINE AND MINED-OUT AREA OF THE
MERCER COAL



EXPLANATION

〰 Crop line of the Middle Kittanning coal

▨ Extent of known strip mining

Ƴ Deep-mine opening

MAP RELIABILITY

Coal crop line—fair to good
Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Upper Freeport coal compiled from unpublished data and extended from adjacent area (Shaulis, J. R., compiler (1985), *Coal resources of Fayette County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 91, Pt. 1, p. 47).

Limits of strip mining based on interpretation of topographic map and aerial photographs.

Locations of deep-mine openings from Shaffner, M. N. (1963), *Geology and mineral resources of the Donegal quadrangle, Pennsylvania*, Pennsylvania Geological Survey, 4th ser., Atlas 48, 116 p.

CROP LINE AND MINED-OUT AREAS OF THE
MIDDLE KITTANNING COAL

MAMMOTH

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

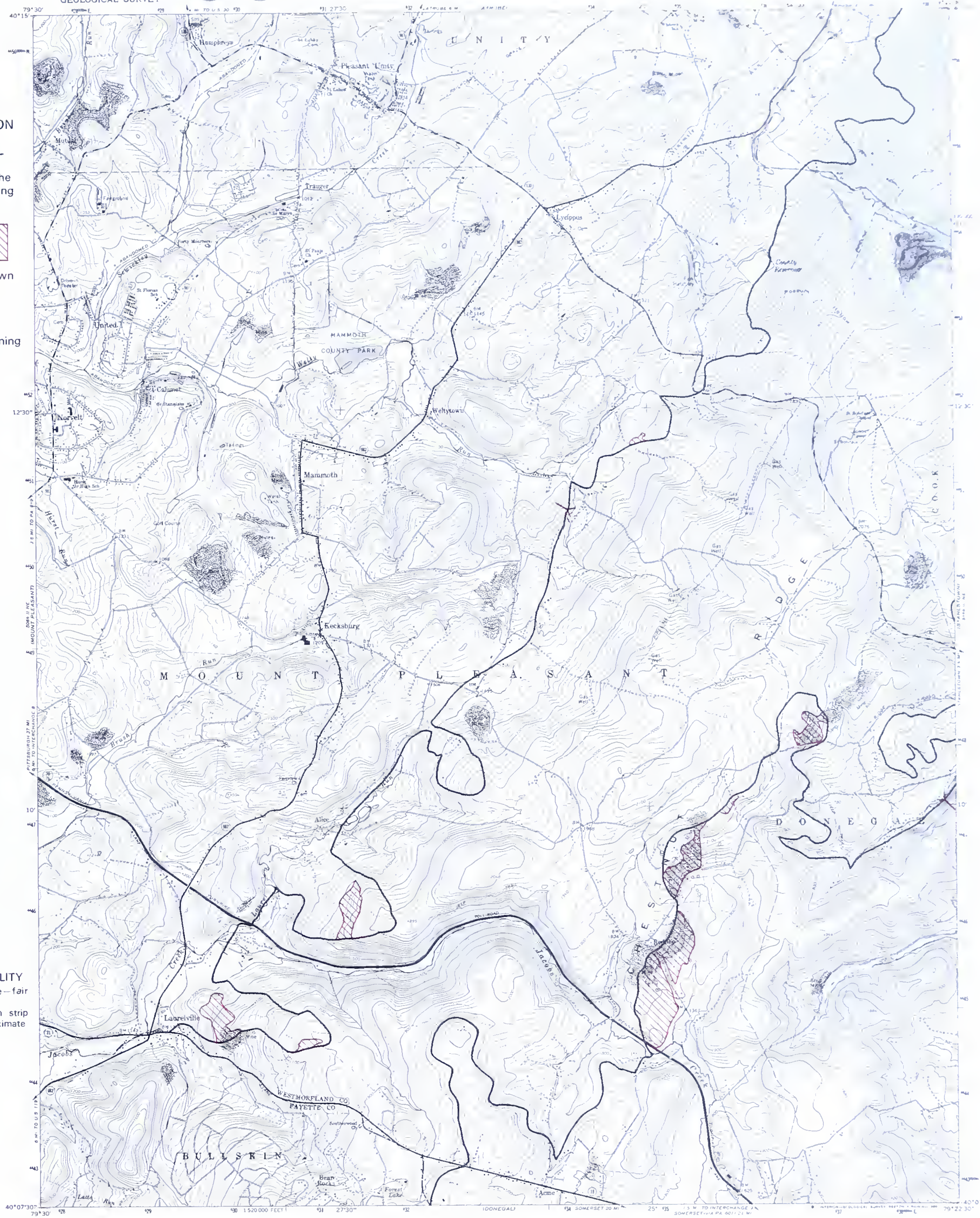
MAMMOTH QUADRANGLE
PENNSYLVANIA
7.5 MINUTE SERIES (TOPOGRAPHIC)

EXPLANATION

〜 Crop line of the Upper Kittanning coal

▨ Extent of known strip mining

Y Deep-mine opening



MAP RELIABILITY

Coal crop line—fair to good

Limits of known strip mining—approximate

SOURCES

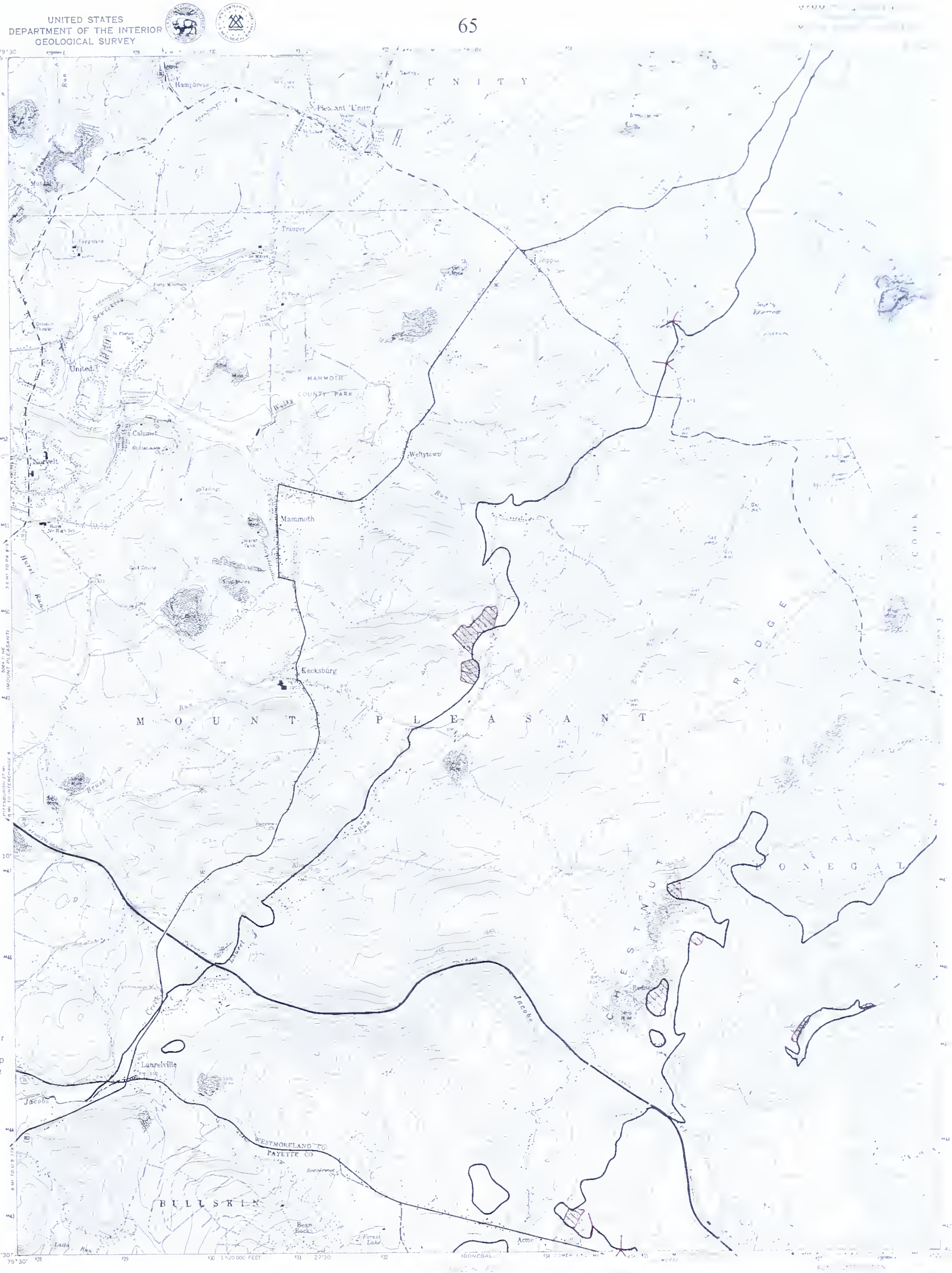
Crop line by V. W. Skema based on interval from structure contours on the Upper Freeport coal compiled from unpublished data and extended from adjacent area (Shaulis, J. R., compiler (1985), *Coal resources of Fayette County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours,* Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 91, Pt. 1, p. 47).

Limits of strip mining based on interpretation of topographic map and aerial photographs.

Locations of deep-mine openings from Shaffner, M. N. (1963), *Geology and mineral resources of the Donegal quadrangle, Pennsylvania,* Pennsylvania Geological Survey, 4th ser., Atlas 48, 116 p.

MAMMOTH

CROP LINE AND MINED-OUT AREAS OF THE
UPPER KITTANNING COAL



EXPLANATION

Crop line of the Upper Freeport coal

▨ Extent of known strip mining

Deep-mine opening

MAP RELIABILITY

Coal crop line—fair to good

Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on structure contours compiled from unpublished data and extended from adjacent area (Shaulis, J. R., compiler (1985), *Coal resources of Fayette County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours,* Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 91, Pt. 1, p. 47).

Limits of strip mining based on interpretation of topographic map and aerial photographs.

Locations of deep-mine openings from Shaffner, M. N. (1963), *Geology and mineral resources of the Donegal quadrangle, Pennsylvania,* Pennsylvania Geological Survey, 4th ser., Atlas 48, 116 p.

CROP LINE AND MINED-OUT AREAS OF THE UPPER FREEPORT COAL

MAMMOTH

EXPLANATION

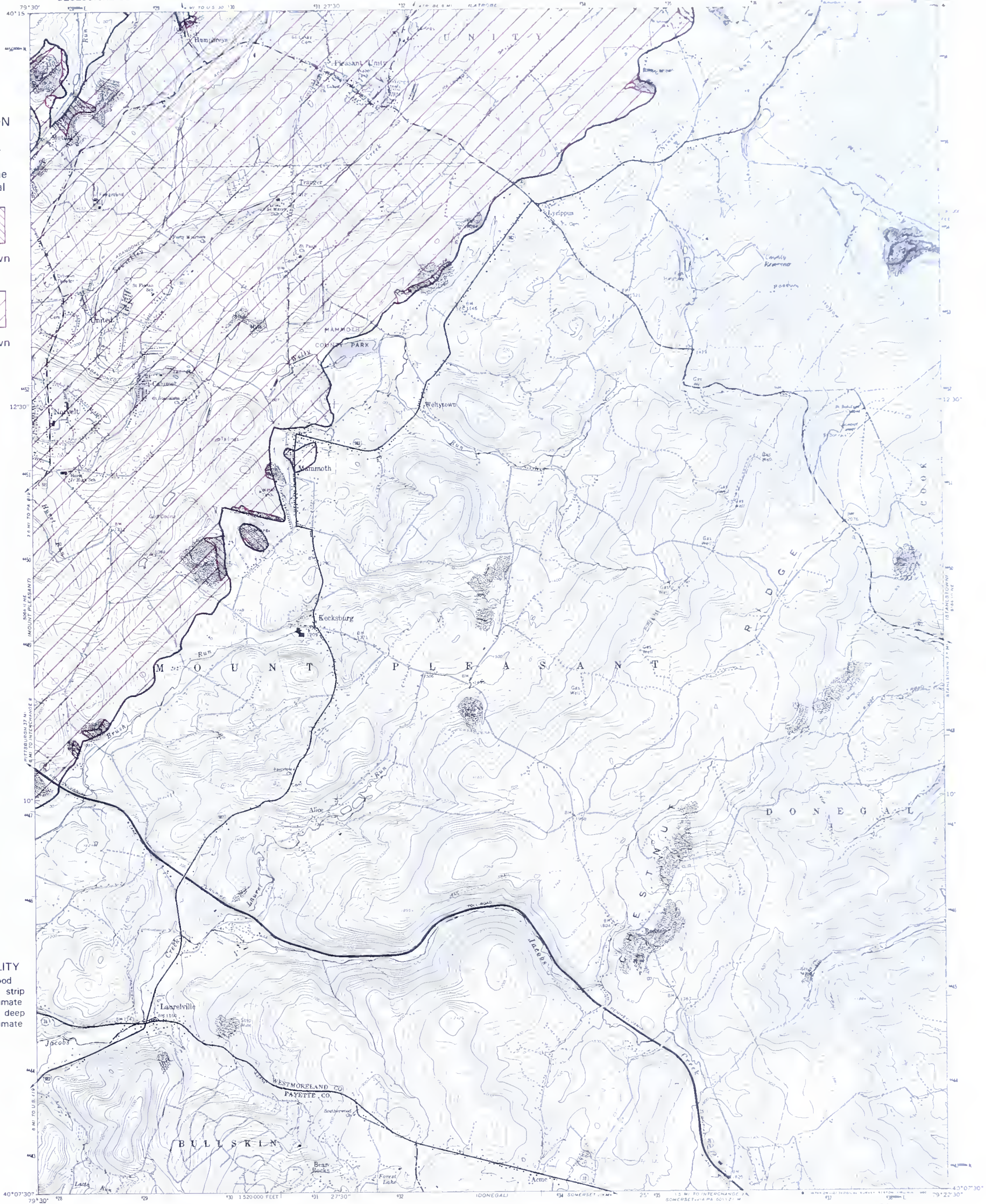
〜 Crop line of the Pittsburgh coal

▨ Extent of known strip mining

▨ Extent of known deep mining

MAP RELIABILITY

Coal crop line—good
Limits of known strip mining—approximate
Limits of known deep mining—approximate



SOURCES

Crop line by V. W. Skema based on structure contours modified from unpublished data.
Limits of strip mining based on interpretation of topographic map and aerial photographs.
Limits of deep mining from unpublished mine maps.

MAMMOTH

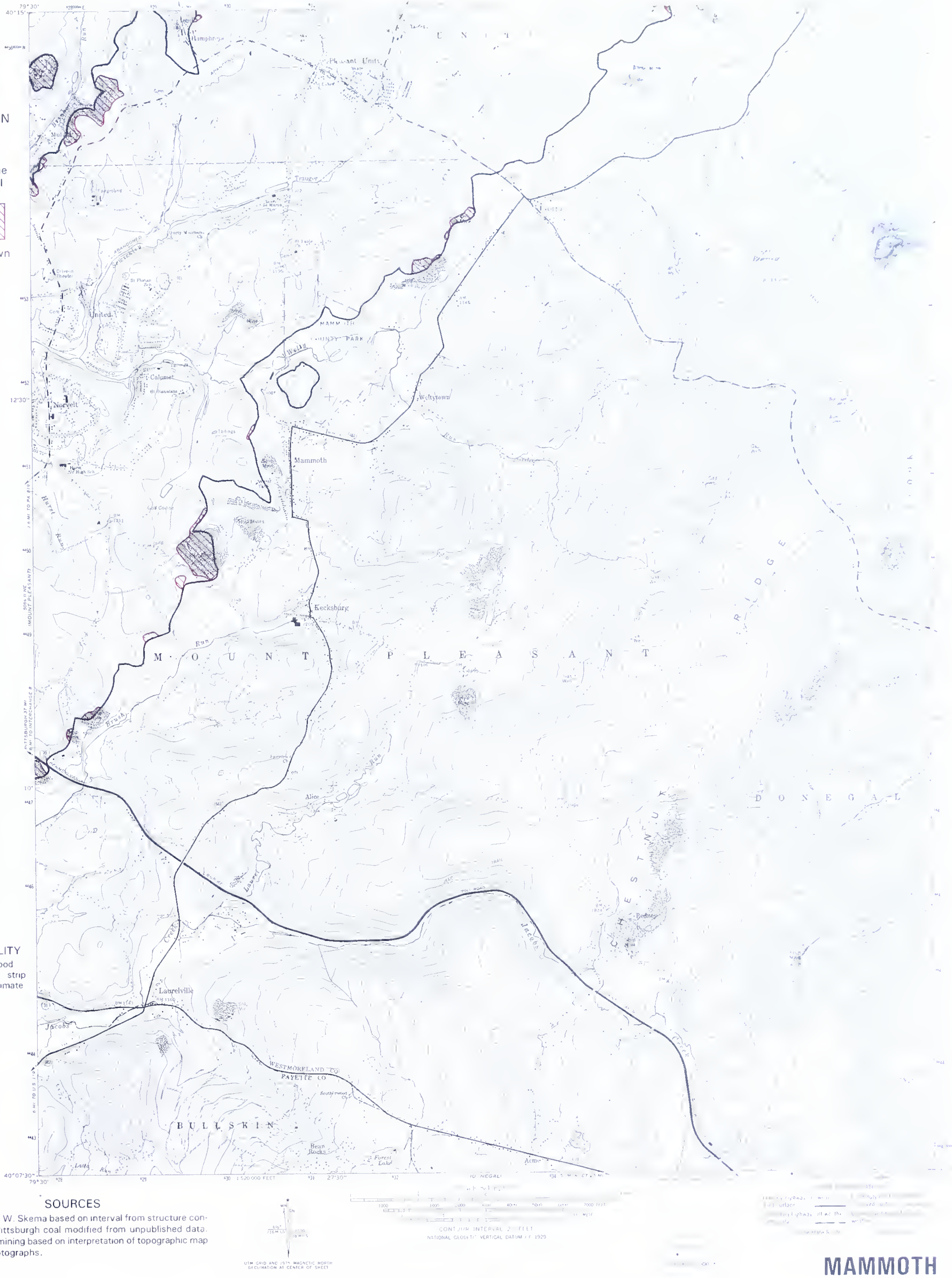
CROP LINE AND MINED-OUT AREAS OF THE
PITTSBURGH COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

〰 Crop line of the Redstone coal

▨ Extent of known strip mining



MAP RELIABILITY

Coal crop line—good
Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Pittsburgh coal modified from unpublished data. Limits of strip mining based on interpretation of topographic map and aerial photographs.

MAMMOTH

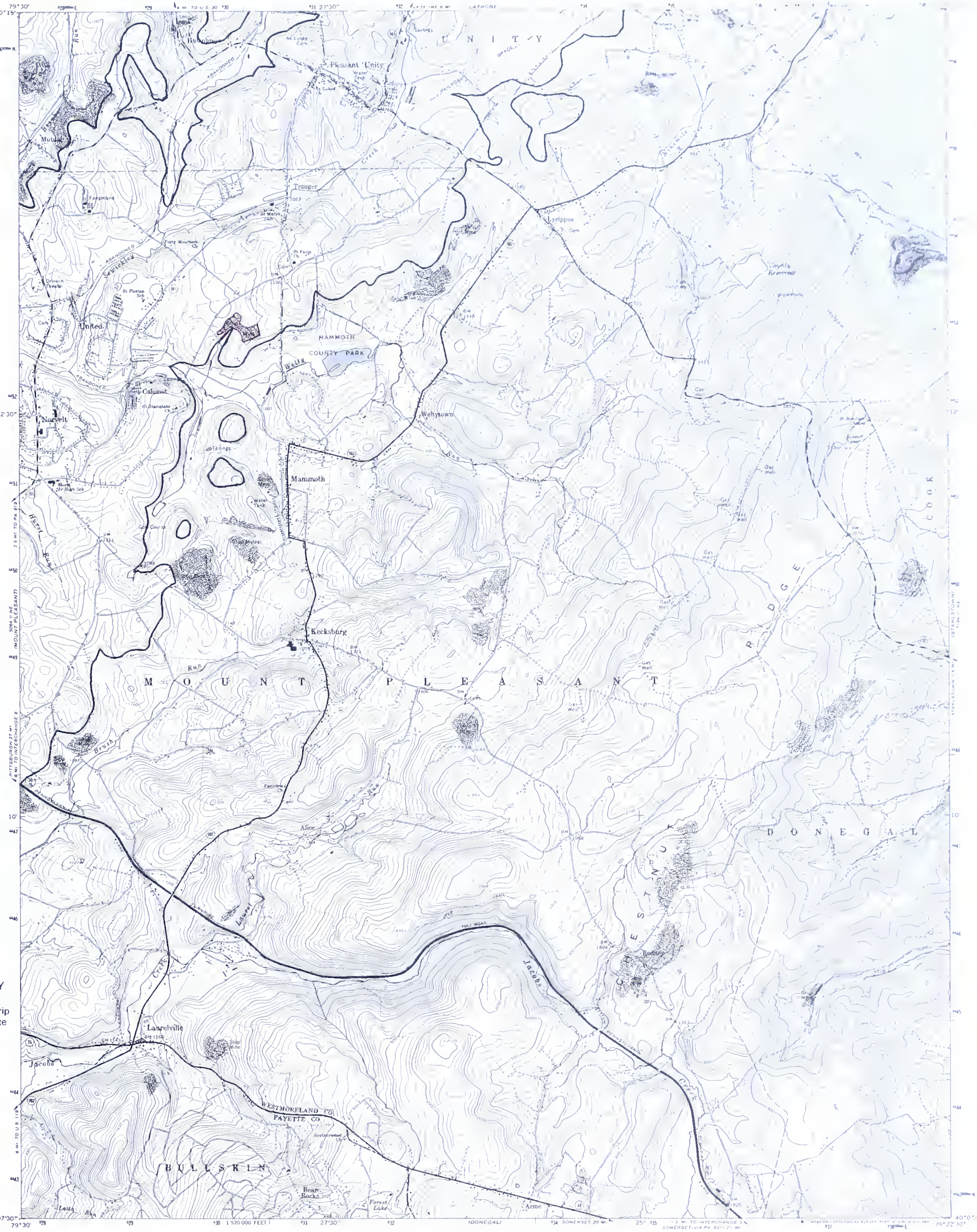
CROP LINE AND MINED-OUT AREAS OF THE
REDSTONE COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

〰 Crop line of the Sewickley coal

▨ Extent of known strip mining



MAP RELIABILITY

Coal crop line—good
Limits of known strip mining—approximate

SCALE 1:62500

1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 KILOMETER

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

UTM GRID AND 1979 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

PENNSYLVANIA
QUADRANGLE LOCATION

ROAD CLASSIFICATION

Primary highway, all weather hard surface	Light-duty road, all weather improved surface
Secondary highway, all weather, hard surface	Unimproved road, fair or dry weather
Interstate Route	State Route

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Pittsburgh coal modified from unpublished data, and also on location of strip mine on topographic map. Limits of strip mining based on interpretation of topographic map.

MAMMOTH

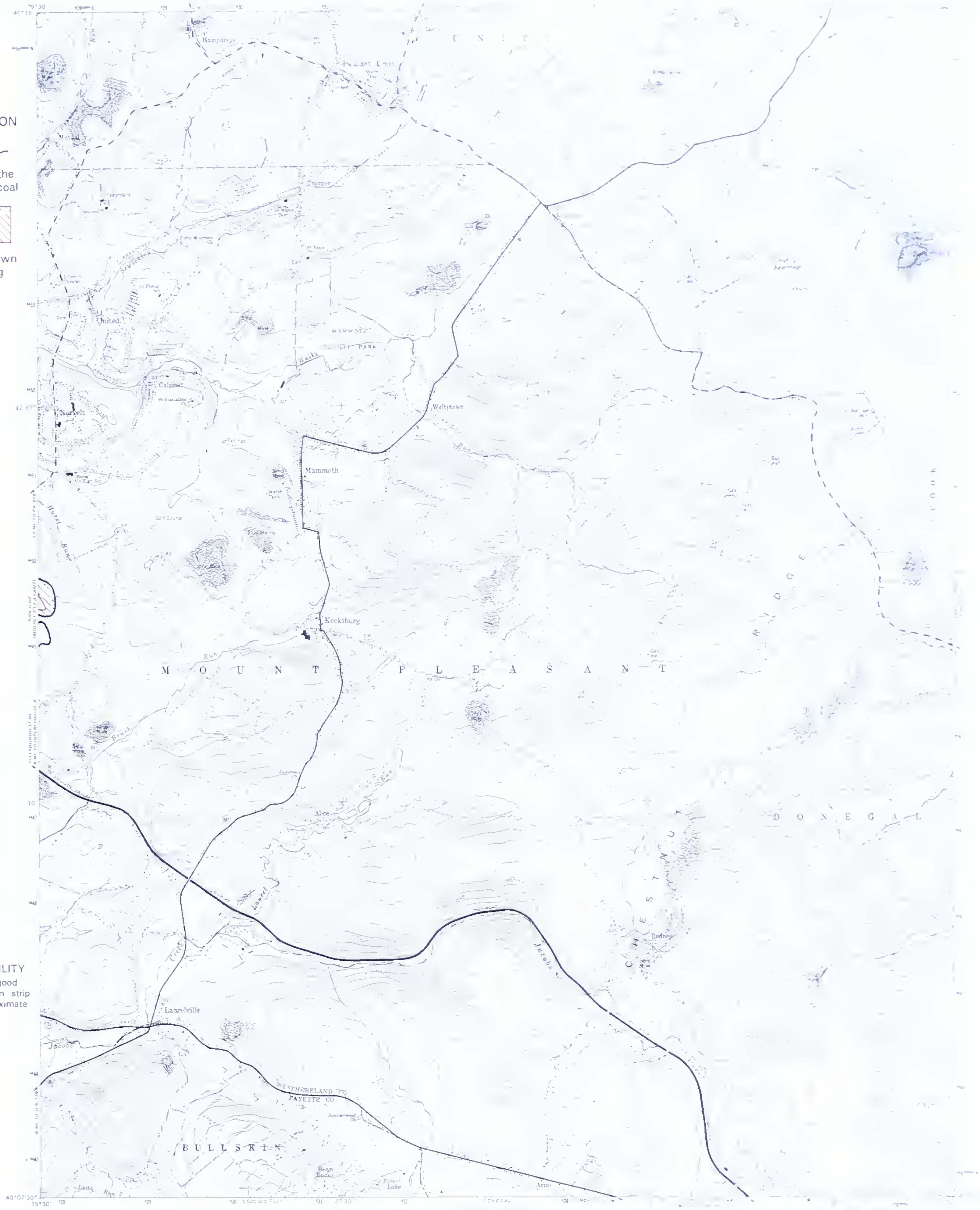
CROP LINE AND MINED-OUT AREA OF THE
SEWICKLEY COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

〰 Crop line of the Waynesburg coal

▨ Extent of known strip mining



MAP RELIABILITY

Coal crop line—good
Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Pittsburgh coal modified from unpublished data. Limits of strip mining based on interpretation of topographic map and aerial photographs.

MAMMOTH

CROP LINE AND MINED-OUT AREA OF THE

WAYNESBURG COAL

EXPLANATION

CROP LINES

—wb— Waynesburg coal

—lwb— Little Waynesburg coal

—s— Sewickley coal

—r— Redstone coal

—p— Pittsburgh coal

—bc— Brush Creek coal

—mh— Mahoning coal

—uf— Upper Freeport coal

—uk— Upper Kittanning coal

—mk— Middle Kittanning coal

—lk— Lower Kittanning coal

—cl— Clarion coal

—bk— Brookville coal

—mr— Mercer coal

Anticline
Showing axial-plane trace and direction of plunge.

Syncline
Showing axial-plane trace and direction of plunge.

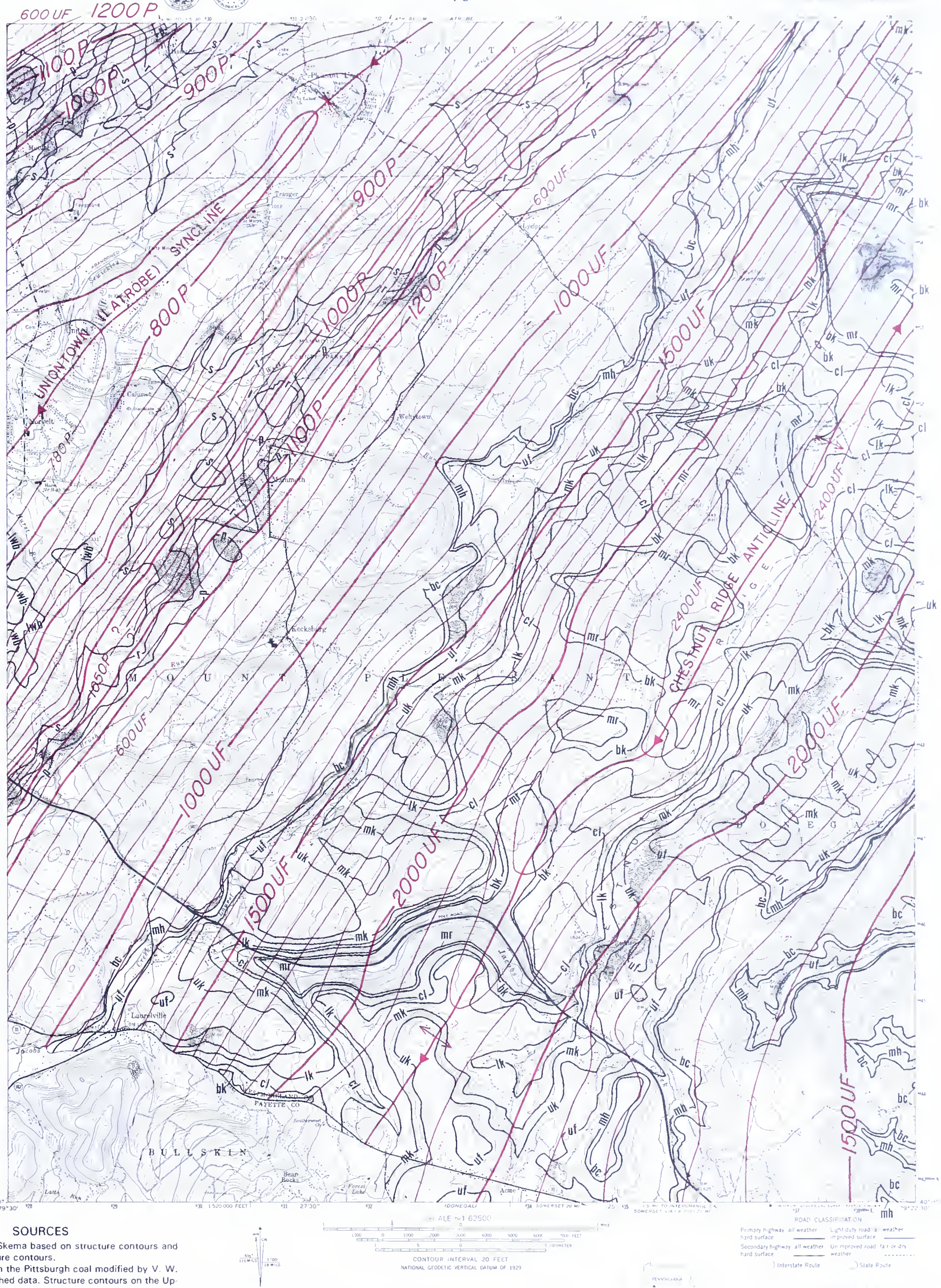
—800P—
Base of Pittsburgh coal
Contour intervals 20 and 50 feet.

—2000UF—
Base of Upper Freeport coal
Contour interval 100 feet.

Structure contours
Altitudes in feet above mean sea level.

MAP RELIABILITY

Coal crop lines—fair to good
Structure contours—fair to good



SOURCES

Crop lines by V. W. Skema based on structure contours and intervals from structure contours.
Structure contours on the Pittsburgh coal modified by V. W. Skema from unpublished data. Structure contours on the Upper Freeport coal compiled by V. W. Skema from unpublished data and contours extended from adjacent area (Shaulis, J. R., compiler (1985), *Coal resources of Fayette County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 91, Pt. 1, p. 47).

MAMMOTH

COAL CROP LINES AND STRUCTURE CONTOURS

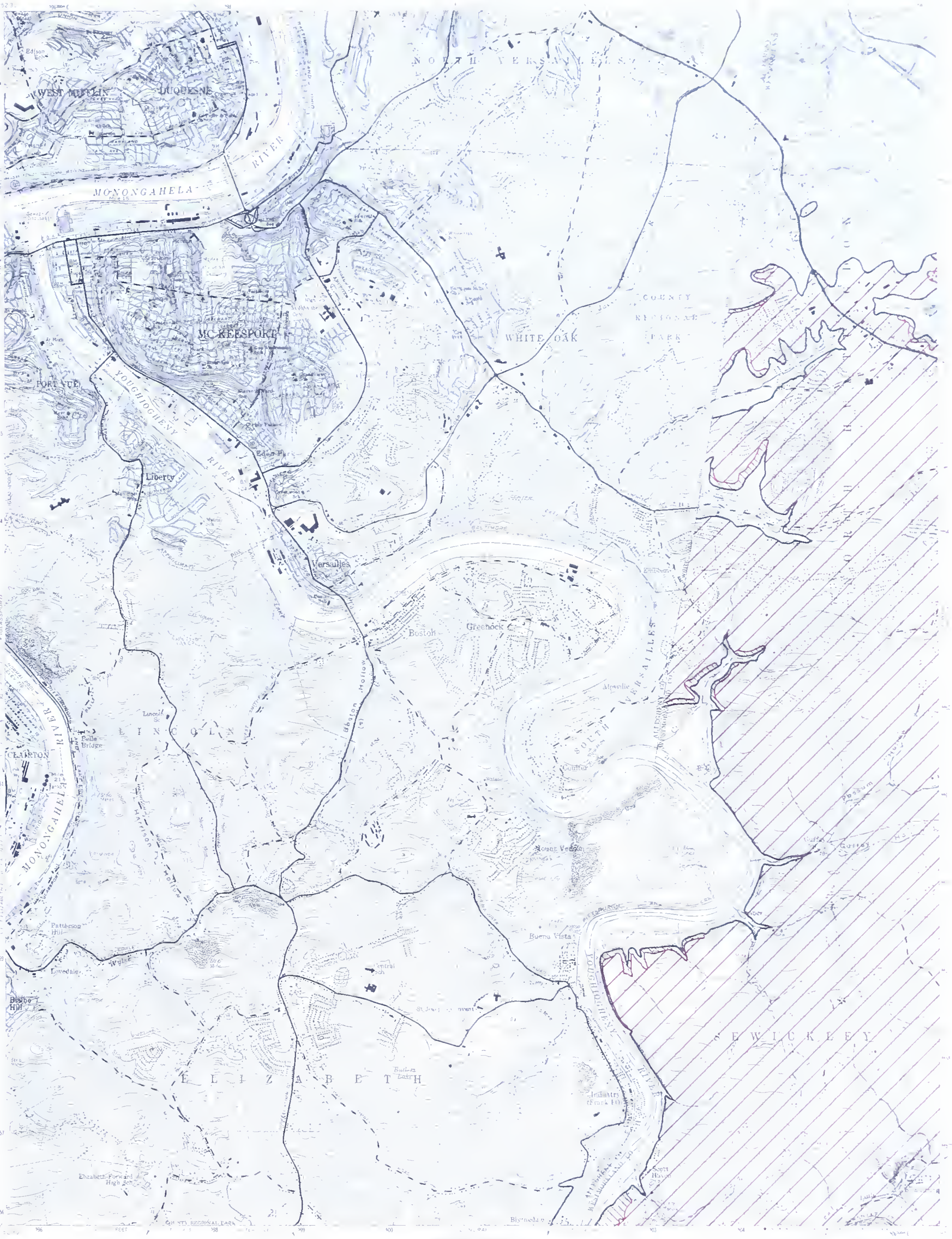
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

〰 Crop line of the Pittsburgh coal

▧ Extent of known strip mining

▨ Extent of known deep mining



MAP RELIABILITY

Coal crop line—good to very good

Limits of known strip mining—approximate

Limits of known deep mining—approximate

SOURCES

Crop line by V. W. Skema based on structure contours slightly modified from Wagner, W. R., Heyman, L., Craft, J. L., and others (1975), *Greater Pittsburgh Region structure contour map,* Pennsylvania Geological Survey, 4th ser., Map 43, scale 1:125,000; and extended from adjacent area (Dodge, C. H., compiler (1985), *Coal resources of Allegheny County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours,* Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 89, Pt. 1, p. 45).

Limits of strip mining based on interpretation of topographic map.

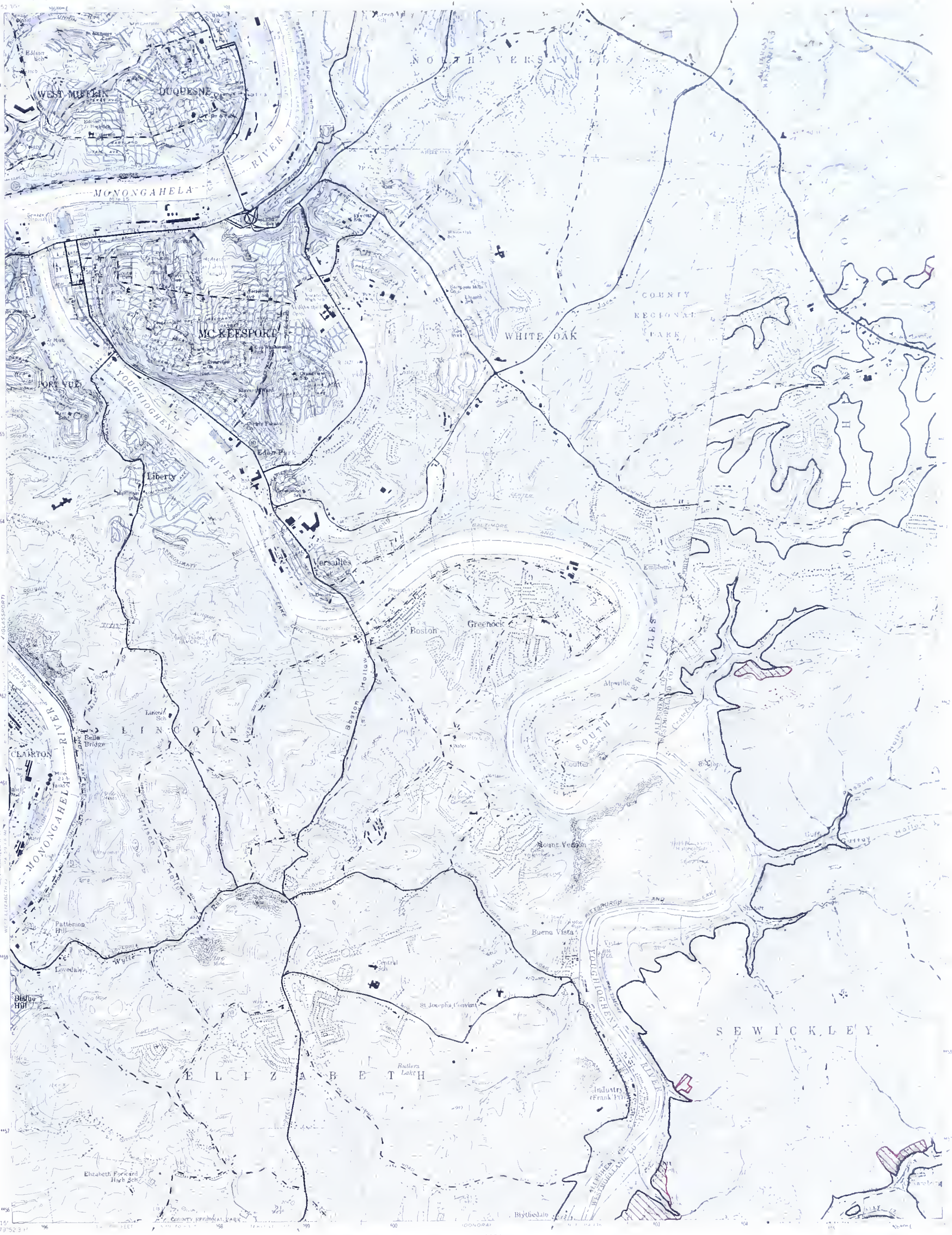
Limits of deep mining from Pennsylvania Department of Environmental Resources, Bureau of Mining and Reclamation (1978), unpublished map.

UTM GRID AND 1973 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

CROP LINE AND MINED-OUT AREAS OF THE
PITTSBURGH COAL

McKEESPORT

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



EXPLANATION

〰 Crop line of the Redstone coal

▧ Extent of known strip mining

▨ Extent of known deep mining

MAP RELIABILITY

Coal crop line—good
Limits of known strip mining—approximate
Limits of known deep mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Pittsburgh coal slightly modified from Wagner, W. R., Heyman, L., Craft, J. L., and others (1975), *Greater Pittsburgh Region structure contour map*, Pennsylvania Geological Survey, 4th ser., Map 43, scale 1:125,000; and extended from adjacent area (Dodge, C. H., compiler (1985), *Coal resources of Allegheny County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 89, Pt. 1, p. 45).
Limits of strip mining based on interpretation of topographic map.
Limits of deep mining from unpublished mine maps.

McKEESPORT

CROP LINE AND MINED-OUT AREAS OF THE

REDSTONE COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

CROP LINES

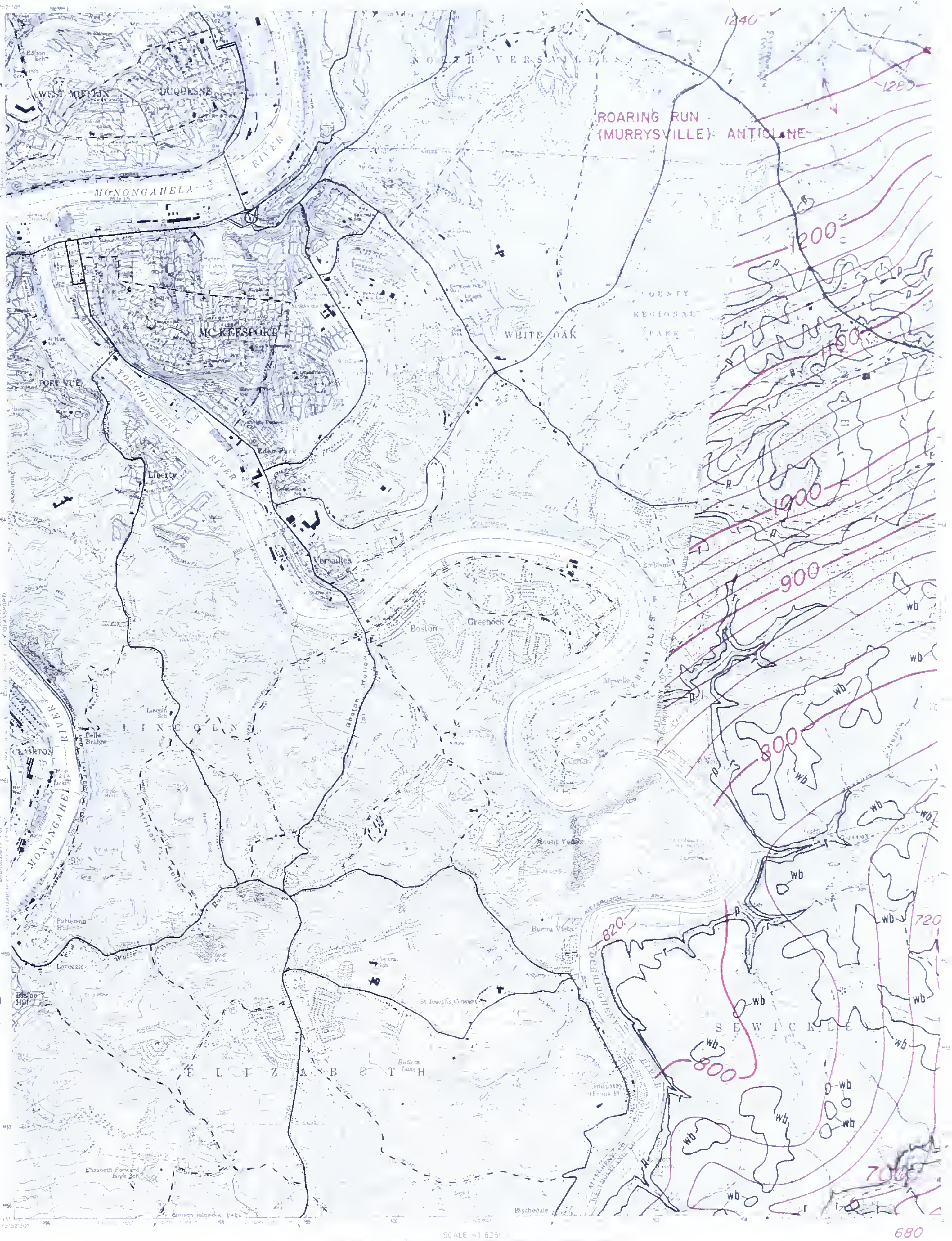
wb — Waynesburg coal

r — Redstone coal

p — Pittsburgh coal

Anticline
Showing axial-plane trace and direction of plunge.

800 — Structure contour
Altitude of the base of the Pittsburgh coal, in feet above mean sea level. Contour interval 20 feet.



MAP RELIABILITY

Coal crop lines—good to very good
Structure contours—good to very good

SOURCES

Crop lines by V. W. Skema based on structure contours and intervals from structure contours.
Structure contours slightly modified by V. W. Skema from Wagner, W. R., Heyman, L., Craft, J. L., and others (1975), *Greater Pittsburgh Region structure contour map*, Pennsylvania Geological Survey, 4th ser., Map 43, scale 1:125,000; and extended from adjacent area (Dodge, C. H., compiler (1985), *Coal resources of Allegheny County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 89, Pt. 1, p. 45).

COAL CROP LINES AND STRUCTURE CONTOURS

McKEESPORT

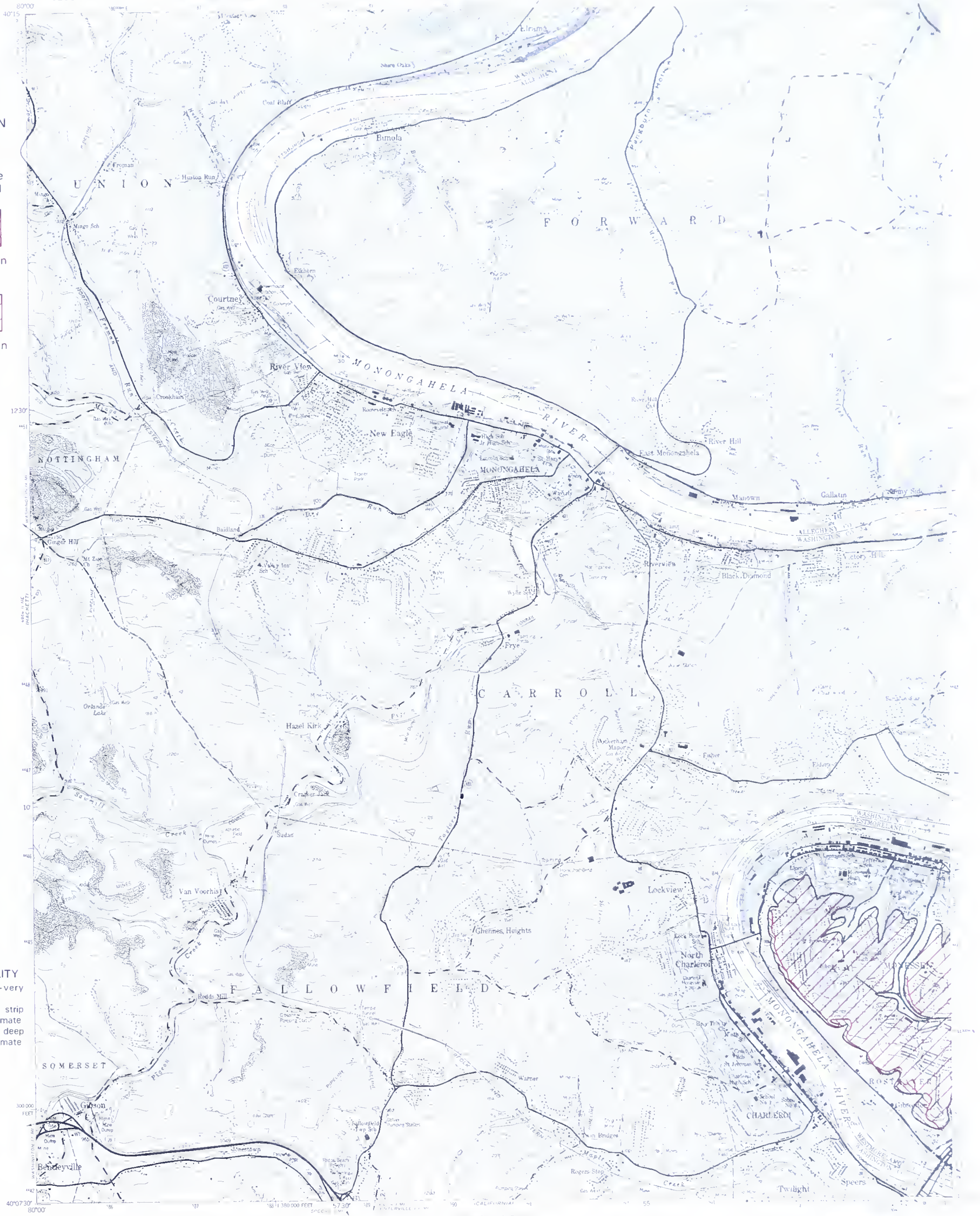
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

〰 Crop line of the Pittsburgh coal

▨ Extent of known strip mining

▨ Extent of known deep mining



MAP RELIABILITY

Coal crop line—very good

Limits of known strip mining—approximate

Limits of known deep mining—approximate

SOURCES

Crop line slightly modified by V. W. Skema from Roen, J. B., Kent, B. H., and Schweinfurth, S. P. (1968), *Geologic map of the Monongahela quadrangle, southwestern Pennsylvania*, U.S. Geological Survey Geologic Quadrangle Map GQ–743, scale 1:24,000.

Limits of strip mining from Roen and others (1968) and interpretation of topographic map.

Limits of deep mining from Pennsylvania Department of Environmental Resources, Bureau of Mining and Reclamation (1978), unpublished map.

MONONGAHELA

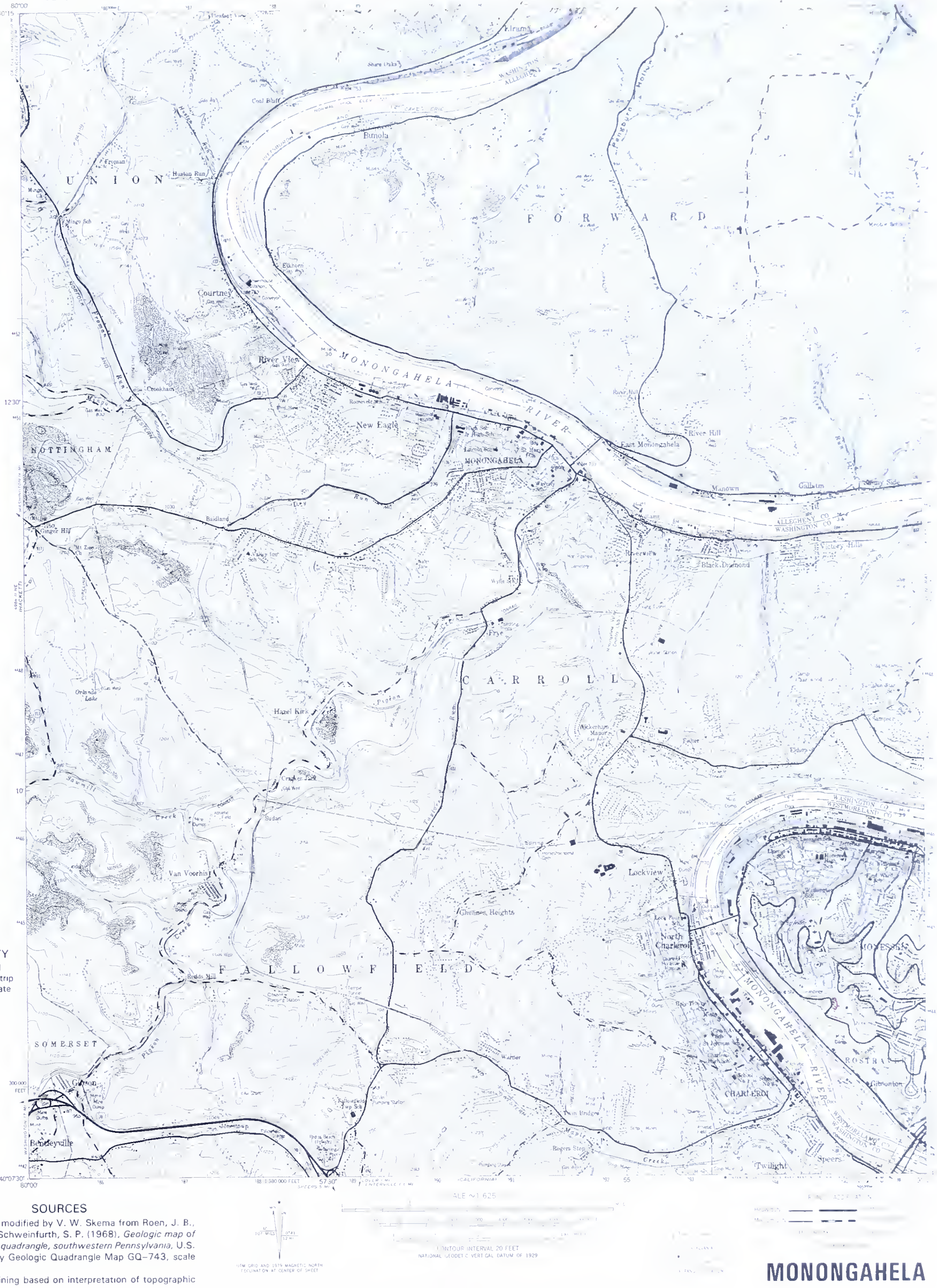
CROP LINE AND MINED-OUT AREAS OF THE
PITTSBURGH COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

Crop line of the Redstone coal

▨ Extent of known strip mining



MAP RELIABILITY

Coal crop line—good
Limits of known strip mining—approximate

SOURCES

Crop line slightly modified by V. W. Skema from Roen, J. B., Kent, B. H., and Schweinfurth, S. P. (1968), *Geologic map of the Monongahela quadrangle, southwestern Pennsylvania*, U.S. Geological Survey Geologic Quadrangle Map GQ–743, scale 1:24,000.

Limits of strip mining based on interpretation of topographic map.

MONONGAHELA

CROP LINE AND MINED-OUT AREA OF THE
REDSTONE COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

CROP LINES

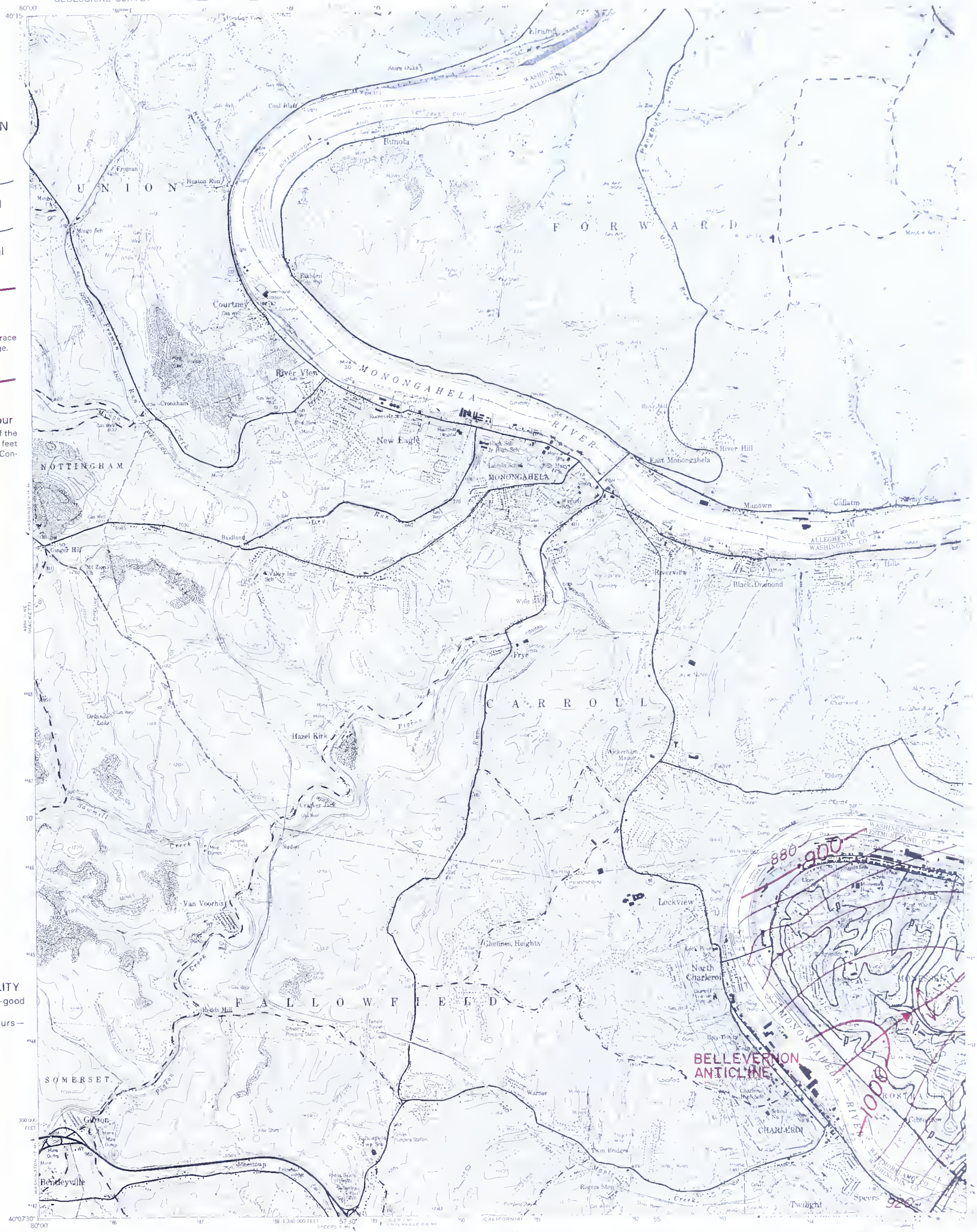
——r——
Redstone coal

——p——
Pittsburgh coal

Anticline
Showing axial-plane trace and direction of plunge.

—900—
Structure contour
Altitude of the base of the Pittsburgh coal, in feet above mean sea level. Contour interval 20 feet.

MAP RELIABILITY
Coal crop lines—good to very good
Structure contours—very good



SOURCES

Crop lines slightly modified by V. W. Skema from Roen, J. B., Kent, B. H., and Schweinfurth, S. P. (1968), *Geologic map of the Monongahela quadrangle, southwestern Pennsylvania*, U.S. Geological Survey Geologic Quadrangle Map GQ–743, scale 1:24,000.
Structure contours from Roen and others (1968).

SCALE 1:62500

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

MONONGAHELA

COAL CROP LINES AND STRUCTURE CONTOURS

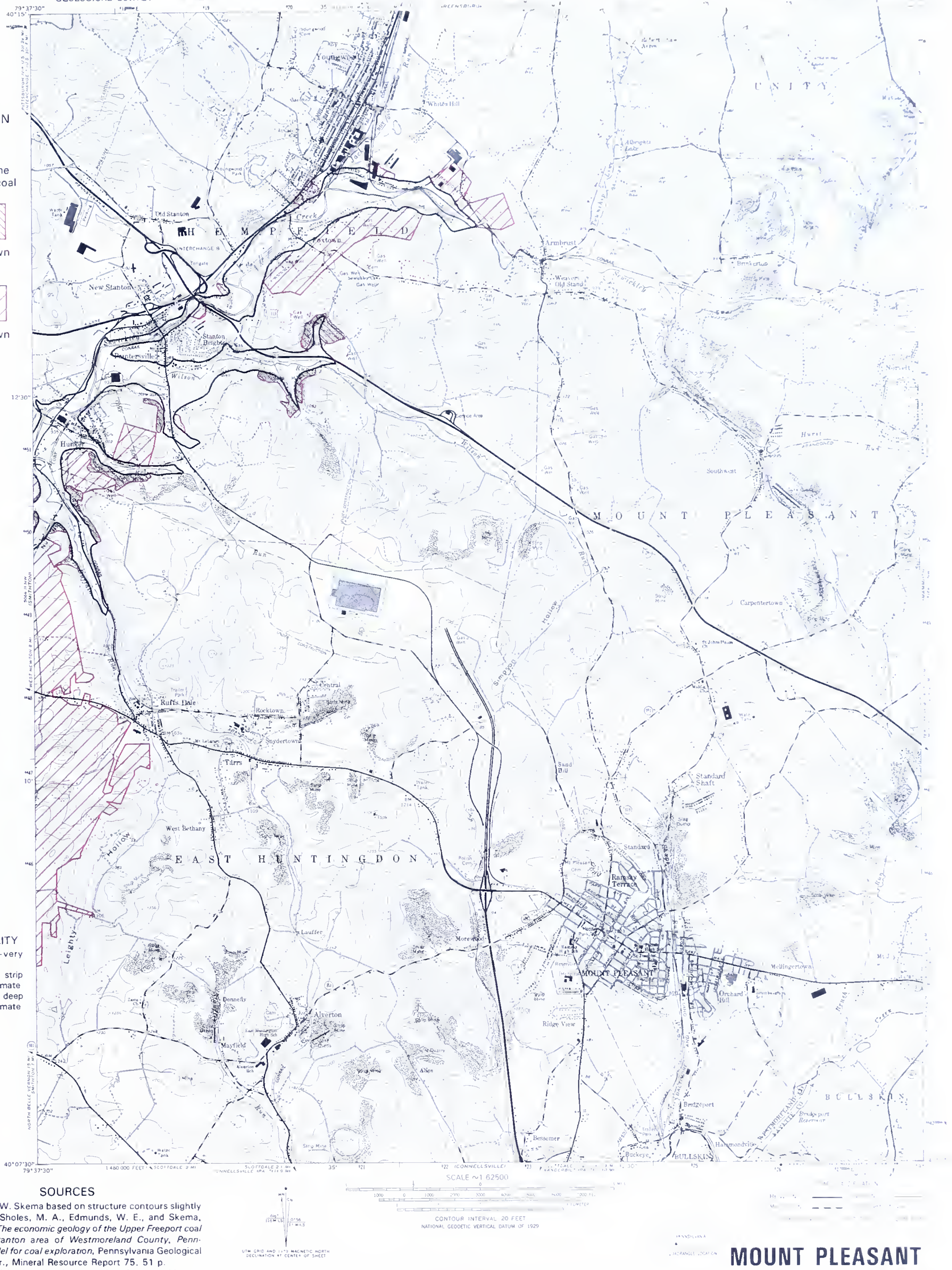
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

〰 Crop line of the Upper Freeport coal

▨ Extent of known strip mining

▨ Extent of known deep mining



MAP RELIABILITY

Coal crop line—very good
Limits of known strip mining—approximate
Limits of known deep mining—approximate

SOURCES

Crop line by V. W. Skema based on structure contours slightly modified from Sholes, M. A., Edmunds, W. E., and Skema, V. W. (1979), *The economic geology of the Upper Freeport coal in the New Stanton area of Westmoreland County, Pennsylvania: a model for coal exploration*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 75, 51 p.
Limits of strip mining based on interpretation of topographic map and aerial photographs.
Limits of deep mining from Sholes and others (1979).

MOUNT PLEASANT

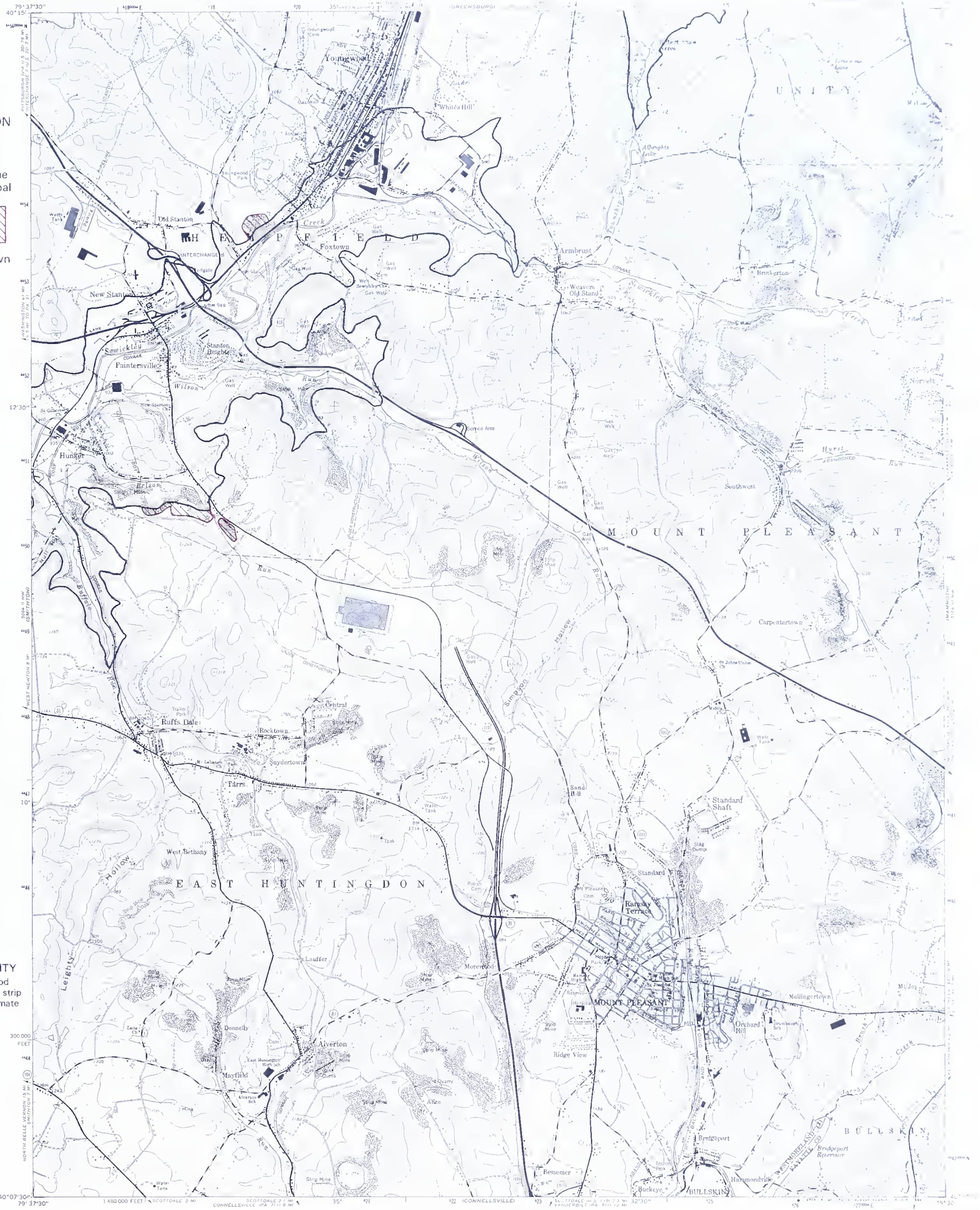
CROP LINE AND MINED-OUT AREAS OF THE
UPPER FREEPORT COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

Crop line of the Brush Creek coal

▨ Extent of known strip mining



MAP RELIABILITY

Coal crop line—good
Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Upper Freeport coal slightly modified from Sholes, M. A., Edmunds, W. E., and Skema, V. W. (1979), *The economic geology of the Upper Freeport coal in the New Stanton area of Westmoreland County, Pennsylvania: a model for coal exploration*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 75, 51 p.; and based on contours extended from adjacent area (Shaulis, J. R., compiler (1985), *Coal resources of Fayette County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 91, Pt. 1, p. 62).

Limits of strip mining based on interpretation of topographic map and aerial photographs.

CROP LINE AND MINED-OUT AREAS OF THE
BRUSH CREEK COAL

MOUNT PLEASANT

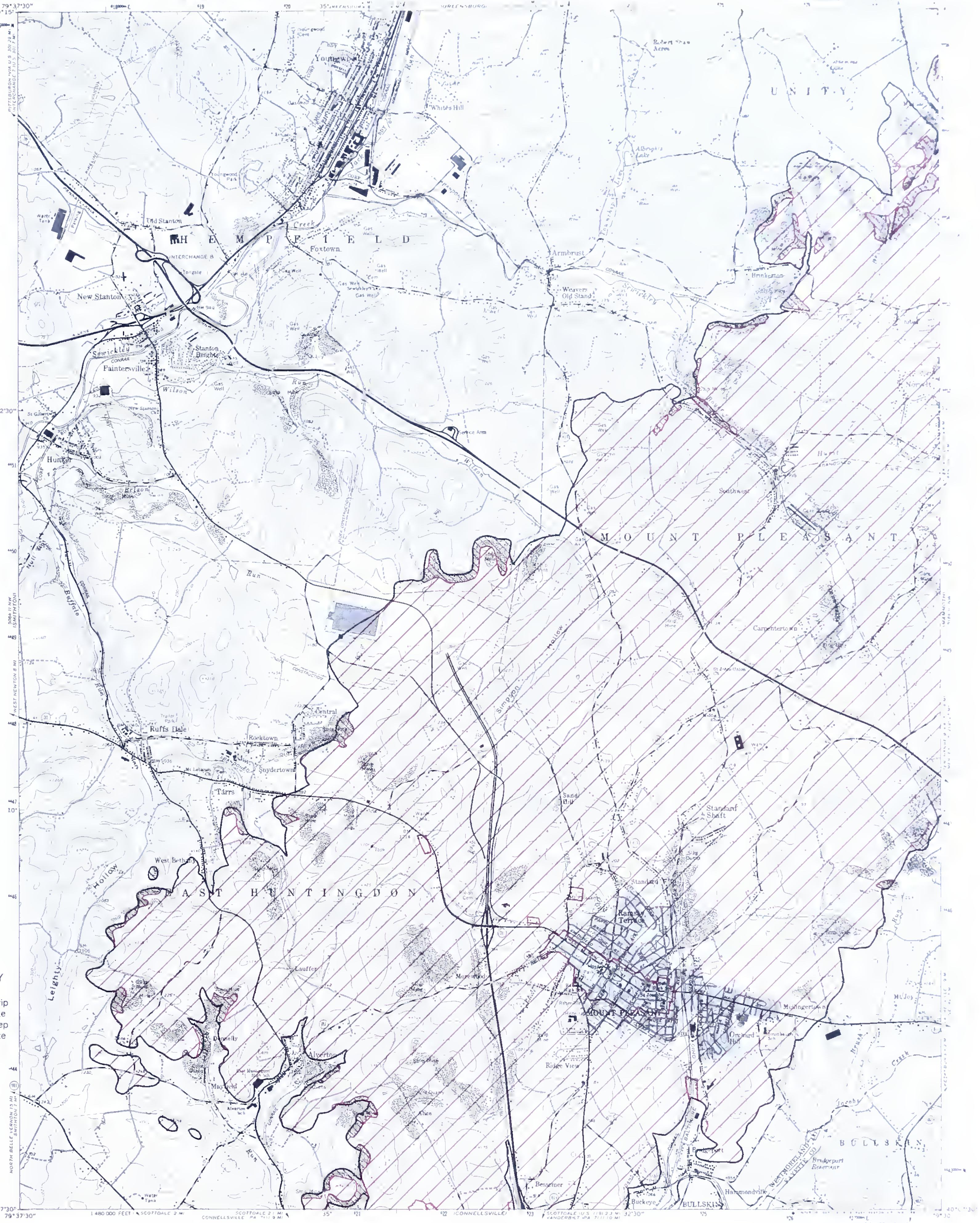
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

Crop line of the Pittsburgh coal

▨ Extent of known strip mining

▨ Extent of known deep mining



SCALE 1:62500

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

UTM GRID AND 1979 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

QUADRANGLE LOCATION

MAP RELIABILITY

Coal crop line—good
Limits of known strip mining—approximate
Limits of known deep mining—approximate

SOURCES

Crop line by V. W. Skema based on structure contours compiled from unpublished data.
Limits of strip mining based on interpretation of topographic map and aerial photographs.
Limits of deep mining from unpublished mine maps

MOUNT PLEASANT

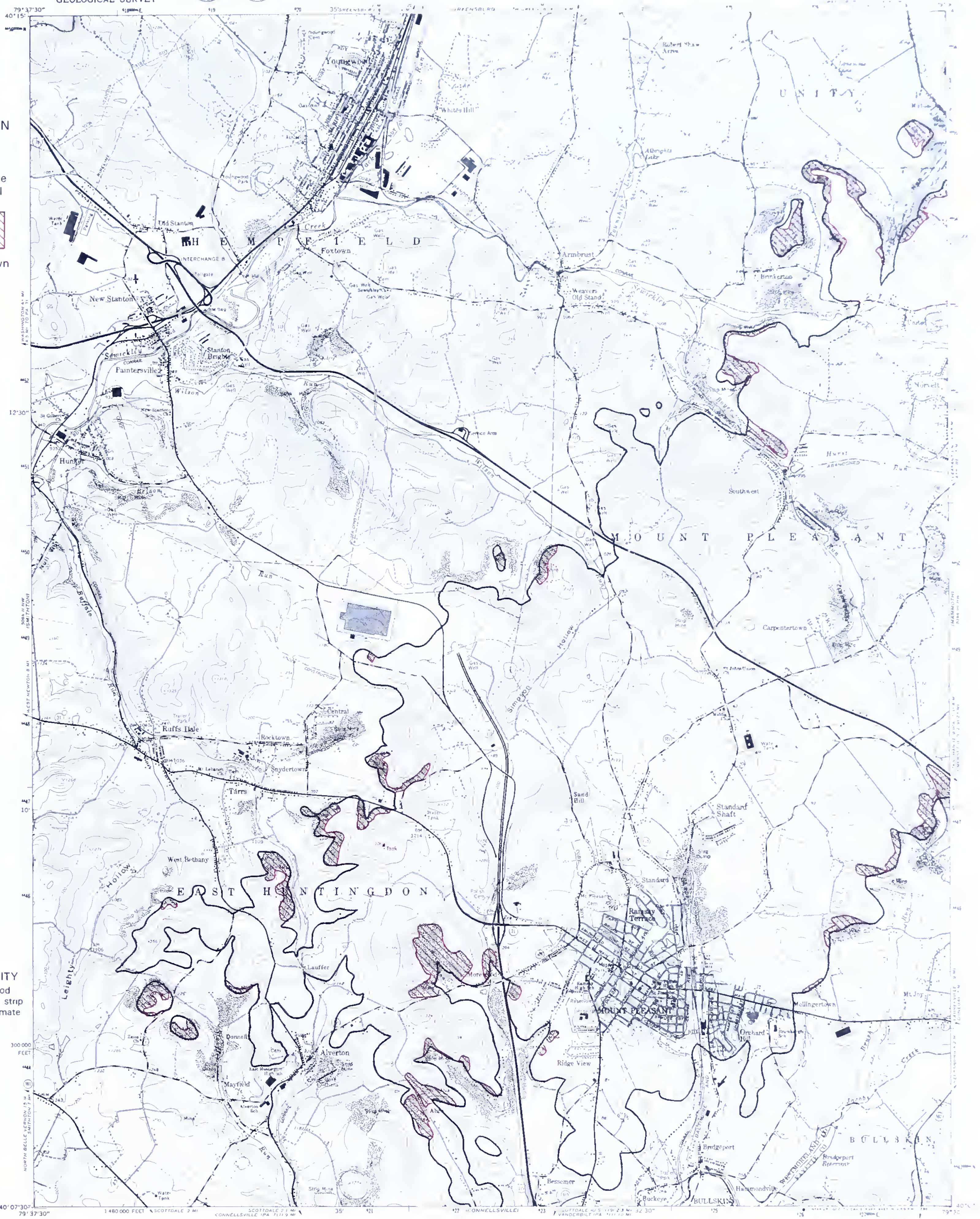
CROP LINE AND MINED-OUT AREAS OF THE
PITTSBURGH COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

〜 Crop line of the Redstone coal

▨ Extent of known strip mining



SCALE 1:62500

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

UTM GRID AND 1979 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

ROAD CLASSIFICATION

MAP RELIABILITY

Coal crop line—good
Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Pittsburgh coal compiled from unpublished data. Limits of strip mining based on interpretation of topographic map and aerial photographs.

MOUNT PLEASANT

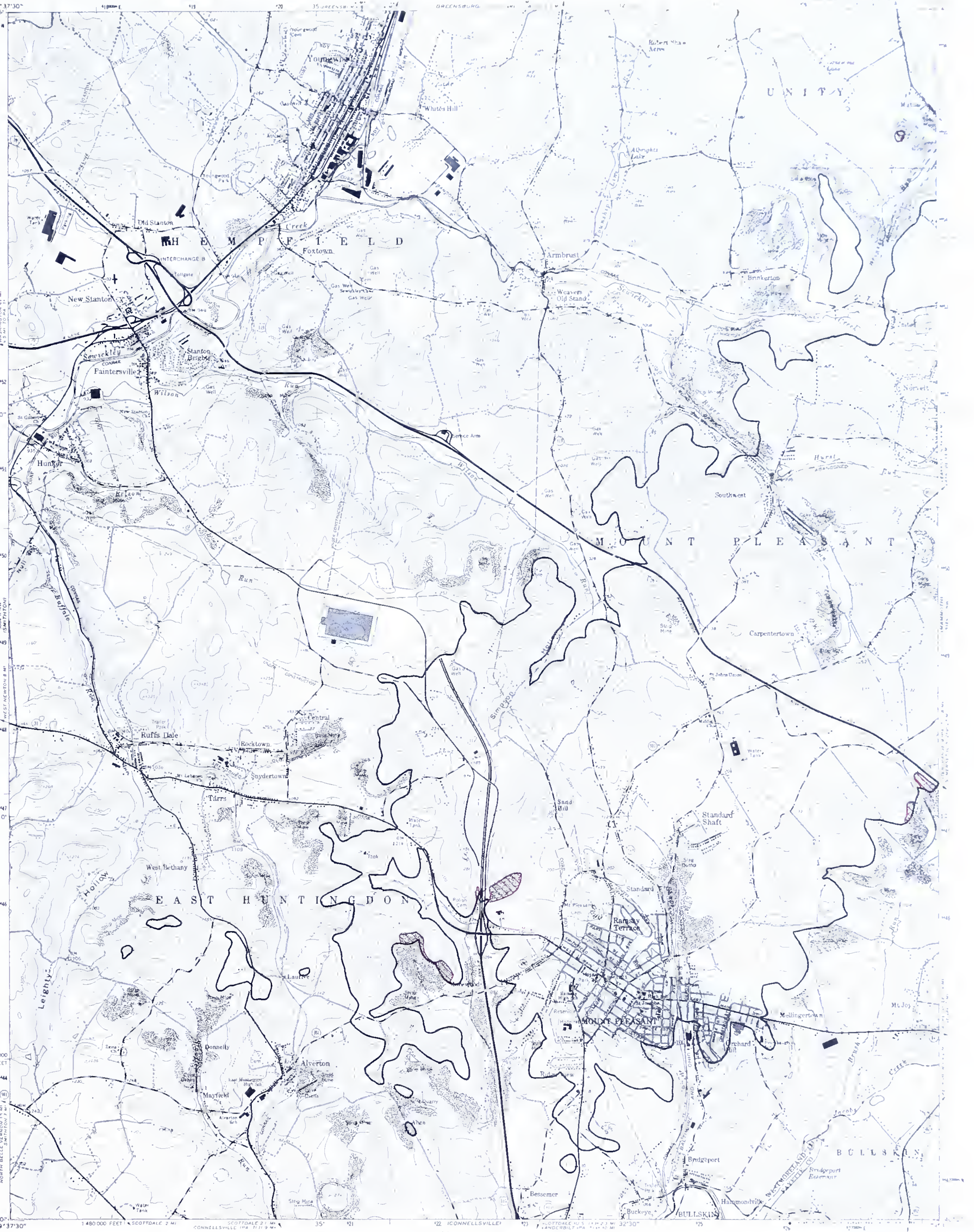
CROP LINE AND MINED-OUT AREAS OF THE
REDSTONE COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

〰 Crop line of the Sewickley coal

▨ Extent of known strip mining



SCALE 1:62500

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

UTM GRID AND 1979 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

MAP RELIABILITY

Coal crop line—good
Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Pittsburgh coal compiled from unpublished data. Limits of strip mining based on interpretation of topographic map.

MOUNT PLEASANT

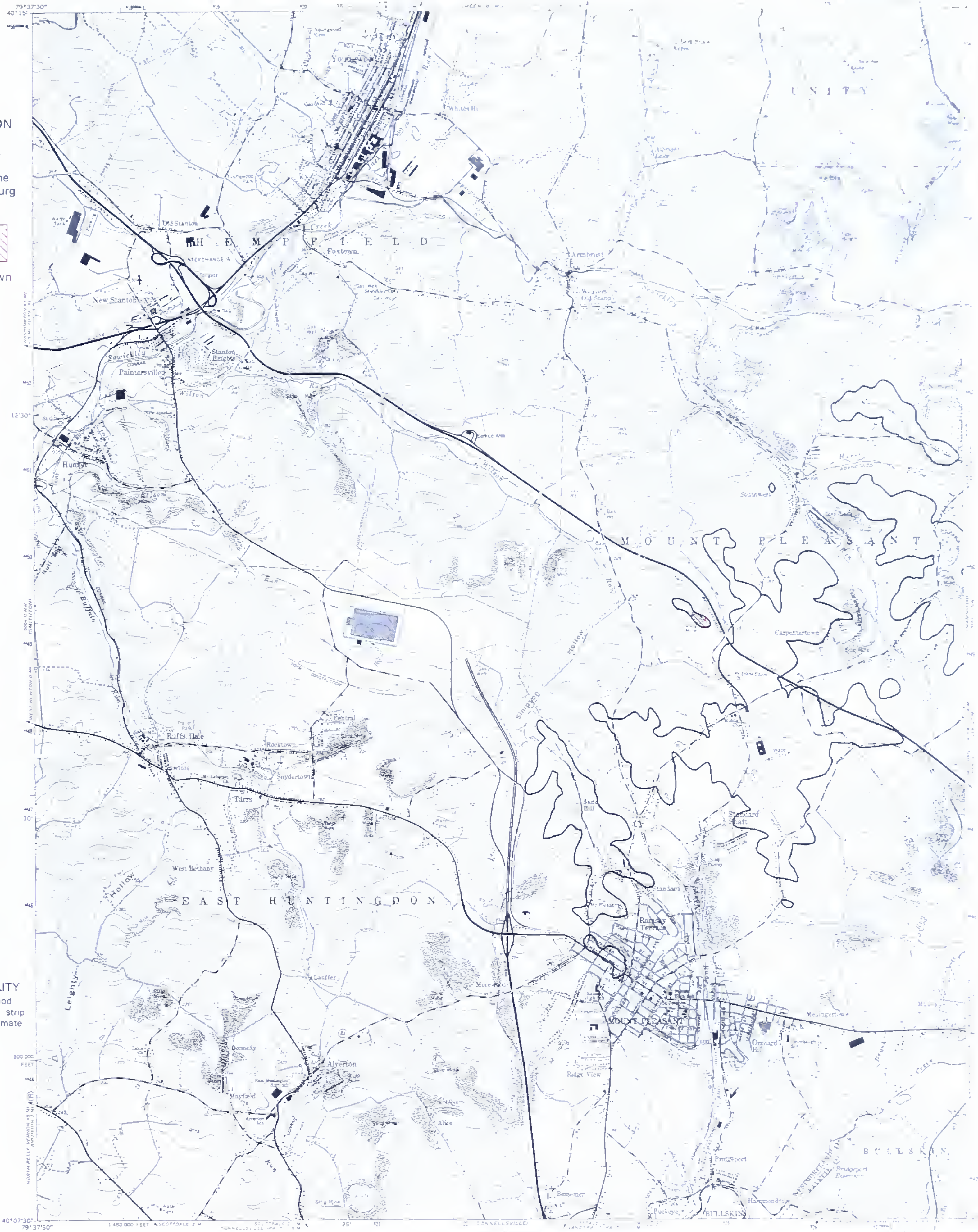
CROP LINE AND MINED-OUT AREAS OF THE
SEWICKLEY COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

〜 Crop line of the Little Waynesburg coal

▨ Extent of known strip mining



MAP RELIABILITY

Coal crop line—good
Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Pittsburgh coal compiled from unpublished data, and also based on location of strip mine on topographic map. Limits of strip mining based on interpretation of topographic map.

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

MOUNT PLEASANT

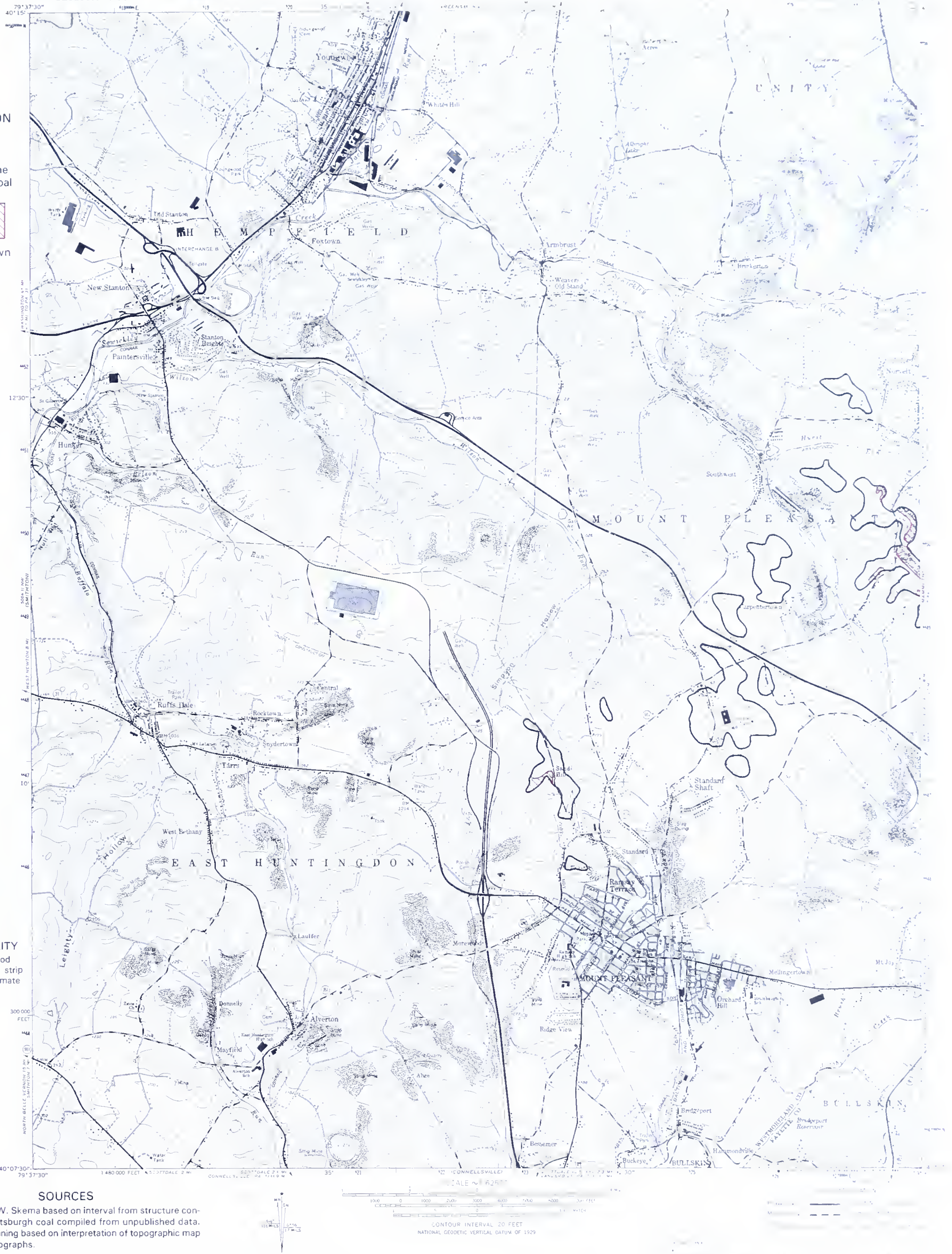
CROP LINE AND MINED-OUT AREA OF THE LITTLE WAYNESBURG COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

Crop line of the Waynesburg coal

▨ Extent of known strip mining



MAP RELIABILITY

Coal crop line—good
Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Pittsburgh coal compiled from unpublished data. Limits of strip mining based on interpretation of topographic map and aerial photographs.

MOUNT PLEASANT

CROP LINE AND MINED-OUT AREAS OF THE

WAYNESBURG COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

CROP LINES

—wb— Waynesburg coal

—lwb— Little Waynesburg coal

—s— Sewickley coal

—r— Redstone coal

—p— Pittsburgh coal

—bc— Brush Creek coal

—mh— Mahoning coal

—uf— Upper Freeport coal

Anticline
Showing axial-plane trace and direction of plunge.

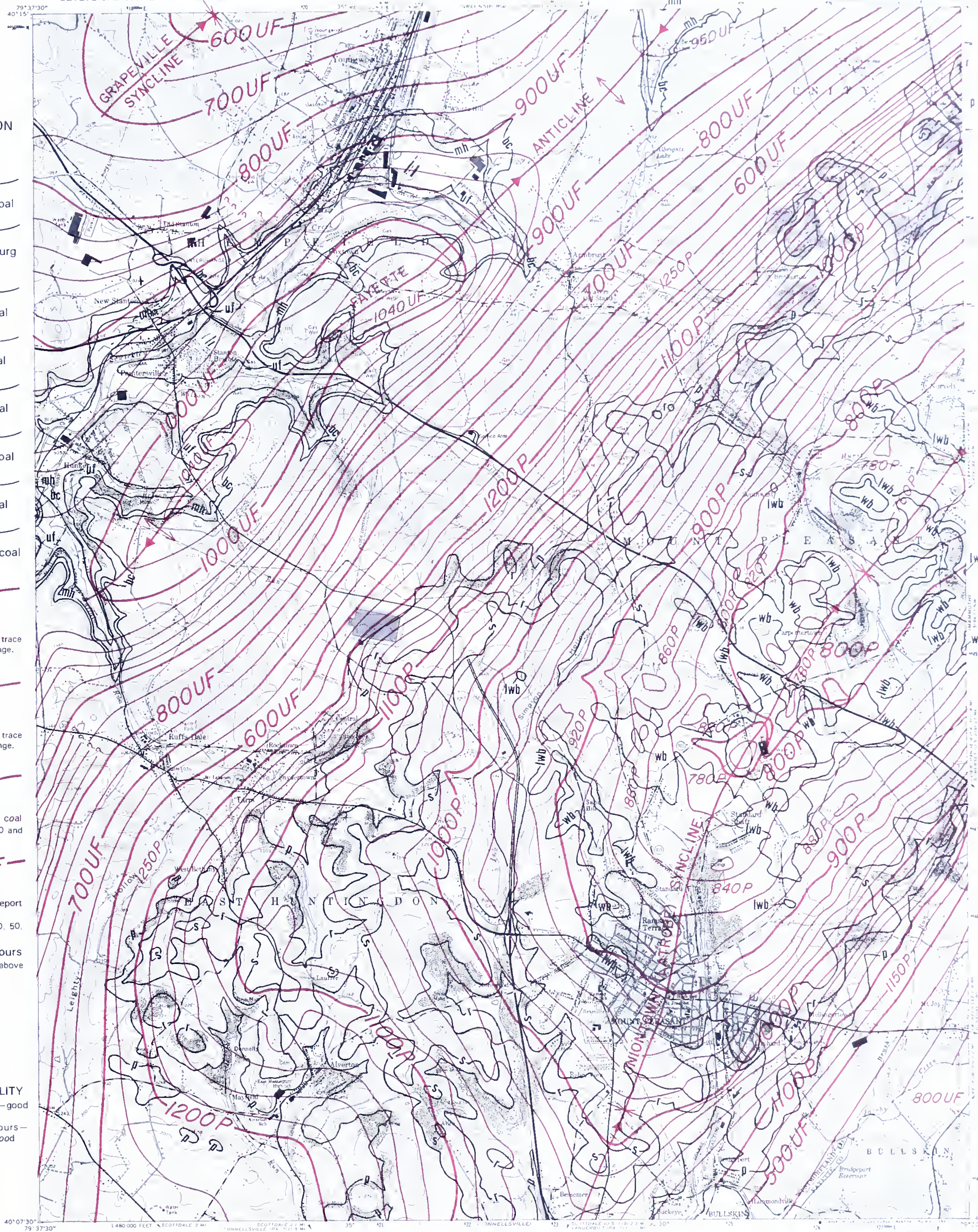
Syncline
Showing axial-plane trace and direction of plunge.

—900P— Base of Pittsburgh coal
Contour intervals 20 and 50 feet.

—700UF— Base of Upper Freeport coal
Contour intervals 20, 50, and 100 feet.

Structure contours
Altitudes in feet above mean sea level.

MAP RELIABILITY
Coal crop lines—good to very good
Structure contours—good to very good



SOURCES

Crop lines by V. W. Skema based on structure contours and intervals from structure contours.

Structure contours on Pittsburgh coal compiled by V. W. Skema from unpublished data. Structure contours on Upper Freeport coal slightly modified by V. W. Skema from Sholes, M. A., Edmunds, W. E., and Skema, V. W. (1979), *The economic geology of the Upper Freeport coal in the New Stanton area of Westmoreland County, Pennsylvania: a model for coal exploration*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 75, 51 p.; and extended from adjacent area (Shaulis, J. R., compiler (1985), *Coal resources of Fayette County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 91, Pt. 1, p. 62).

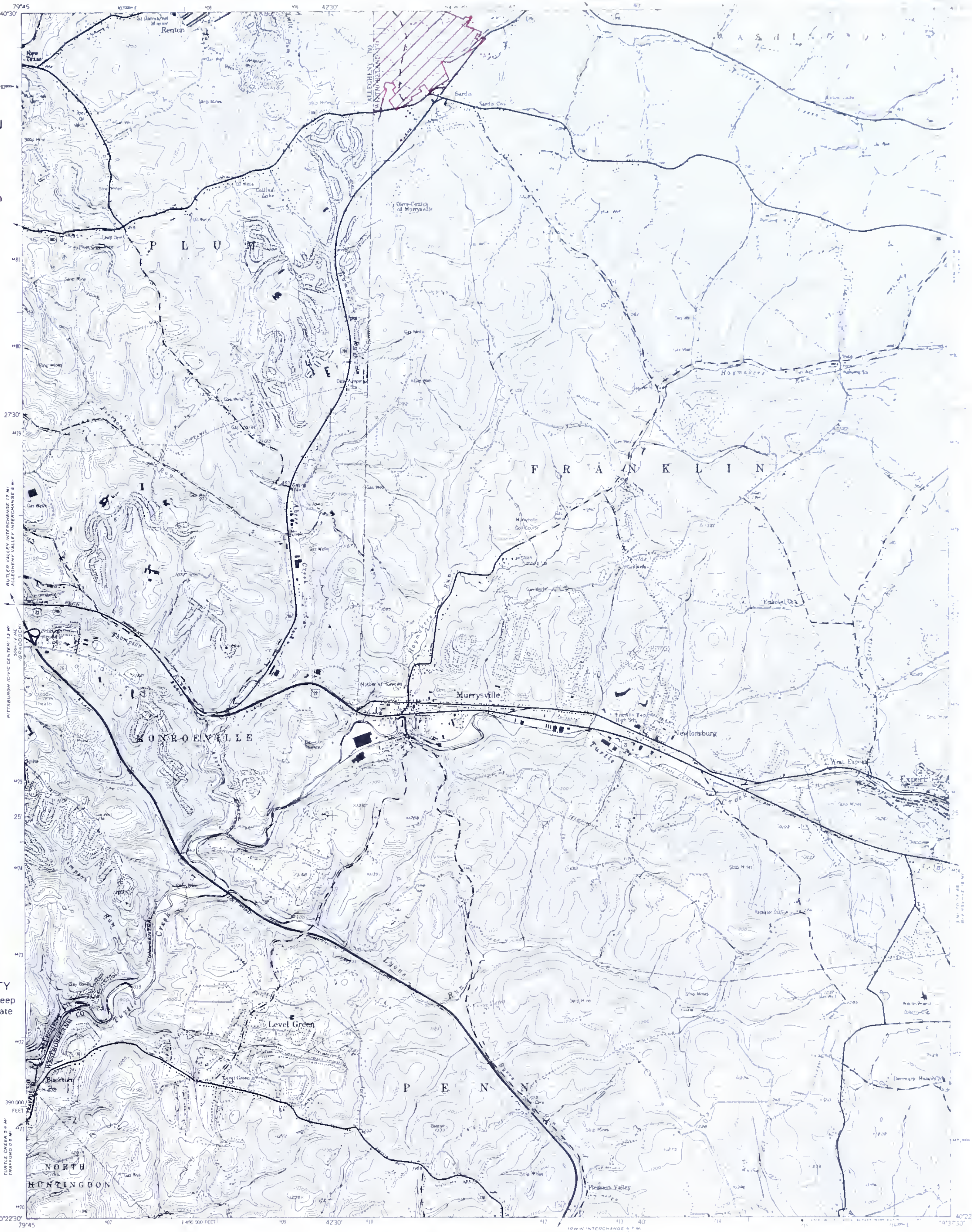
COAL CROP LINES AND STRUCTURE CONTOURS

MOUNT PLEASANT

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

▨ Extent of known deep mining



MAP RELIABILITY

Limits of known deep mining—approximate

SOURCE

Limits of deep mining from unpublished mine maps.

SCALE 1:62 500

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

MINED-OUT AREA OF THE UPPER FREEPORT COAL

MURRYSVILLE

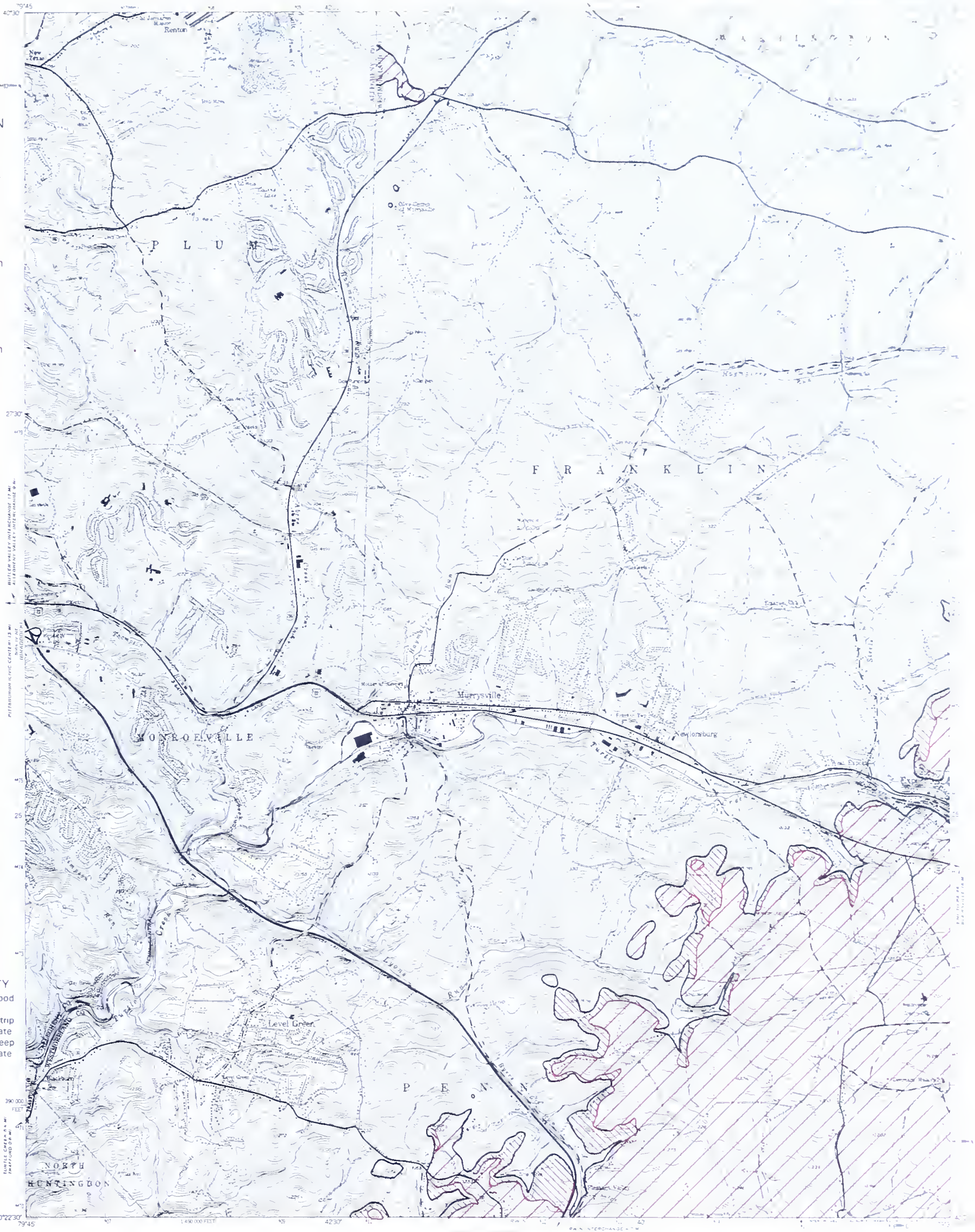
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

〜 Crop line of the Pittsburgh coal

▨ Extent of known strip mining

▨ Extent of known deep mining



MAP RELIABILITY

Coal crop line—good to very good
Limits of known strip mining—approximate
Limits of known deep mining—approximate

SOURCES

Crop line by V. W. Skema based on structure contours compiled from unpublished data; modified from Wagner, W. R., Heyman, L., Craft, J. L., and others (1975), *Greater Pittsburgh Region structure contour map,* Pennsylvania Geological Survey, 4th ser., Map 43, scale 1:125,000; and extended from adjacent area (Dodge, C. H., compiler (1985), *Coal resources of Allegheny County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours,* Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 89, Pt. 1, p. 51).

Limits of strip mining based on interpretation of topographic map.

Limits of deep mining from Pennsylvania Department of Environmental Resources, Bureau of Mining and Reclamation (1978), unpublished map.

CROP LINE AND MINED-OUT AREAS OF THE
PITTSBURGH COAL

MURRYSVILLE

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

CROP LINES

wb — Waynesburg coal

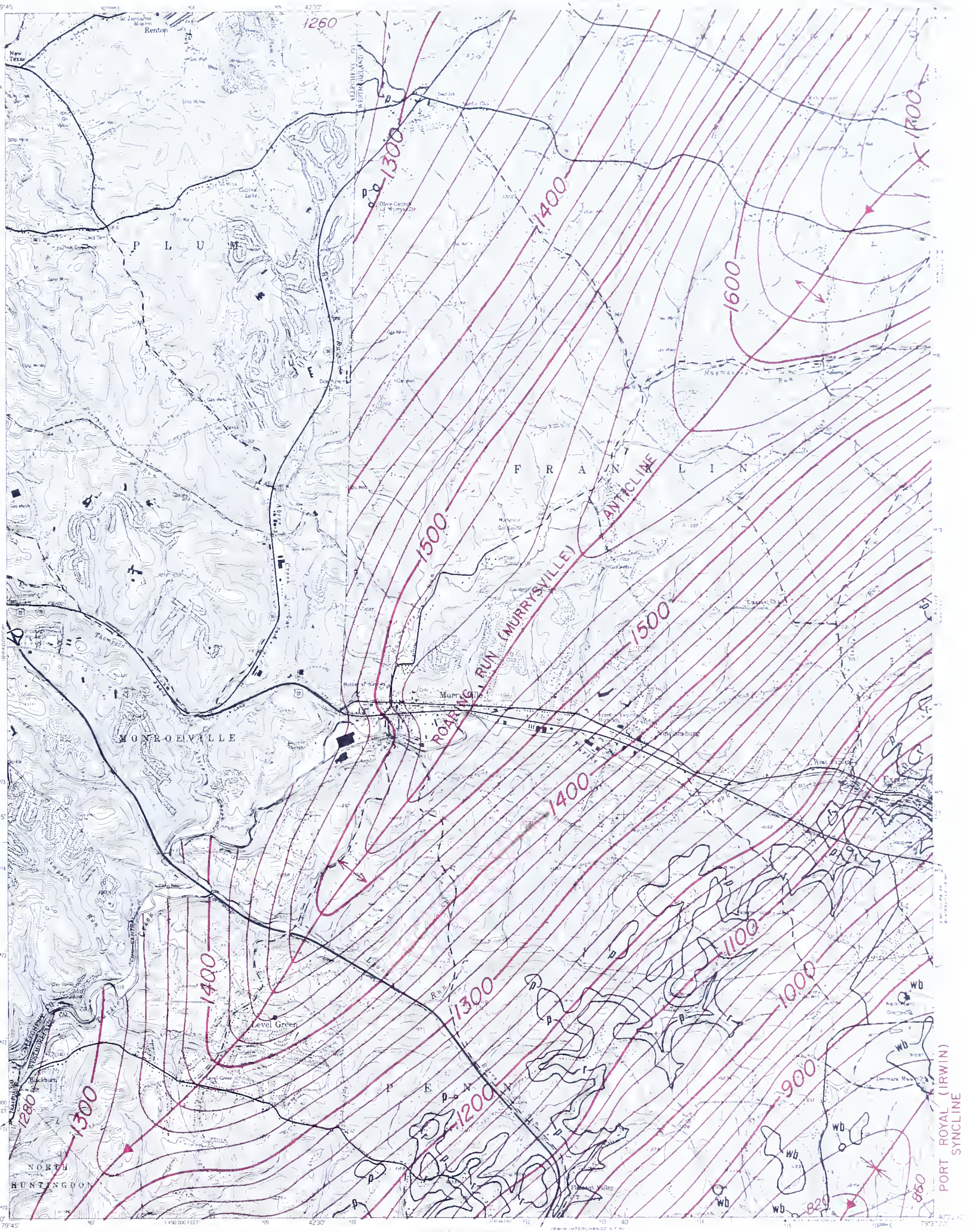
r — Redstone coal

p — Pittsburgh coal

Anticline
Showing axial-plane trace and direction of plunge.

Syncline
Showing axial-plane trace and direction of plunge.

900 — **Structure contour**
Altitude of the base of the Pittsburgh coal, in feet above mean sea level. Contour interval 20 feet.



MAP RELIABILITY
Coal crop lines—good to very good
Structure contours—fair to very good

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

SOURCES

Crop lines by V. W. Skema based on structure contours and intervals from structure contours.

Structure contours compiled by V. W. Skema from unpublished data; modified from Wagner, W. R., Heyman, L., Craft, J. L., and others (1975), *Greater Pittsburgh Region structure contour map*, Pennsylvania Geological Survey, 4th ser., Map 43, scale 1:125,000; and extended from adjacent area (Dodge, C. H., compiler (1985), *Coal resources of Allegheny County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 89, Pt. 1, p. 51).

MURRYSVILLE

COAL CROP LINES AND STRUCTURE CONTOURS

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

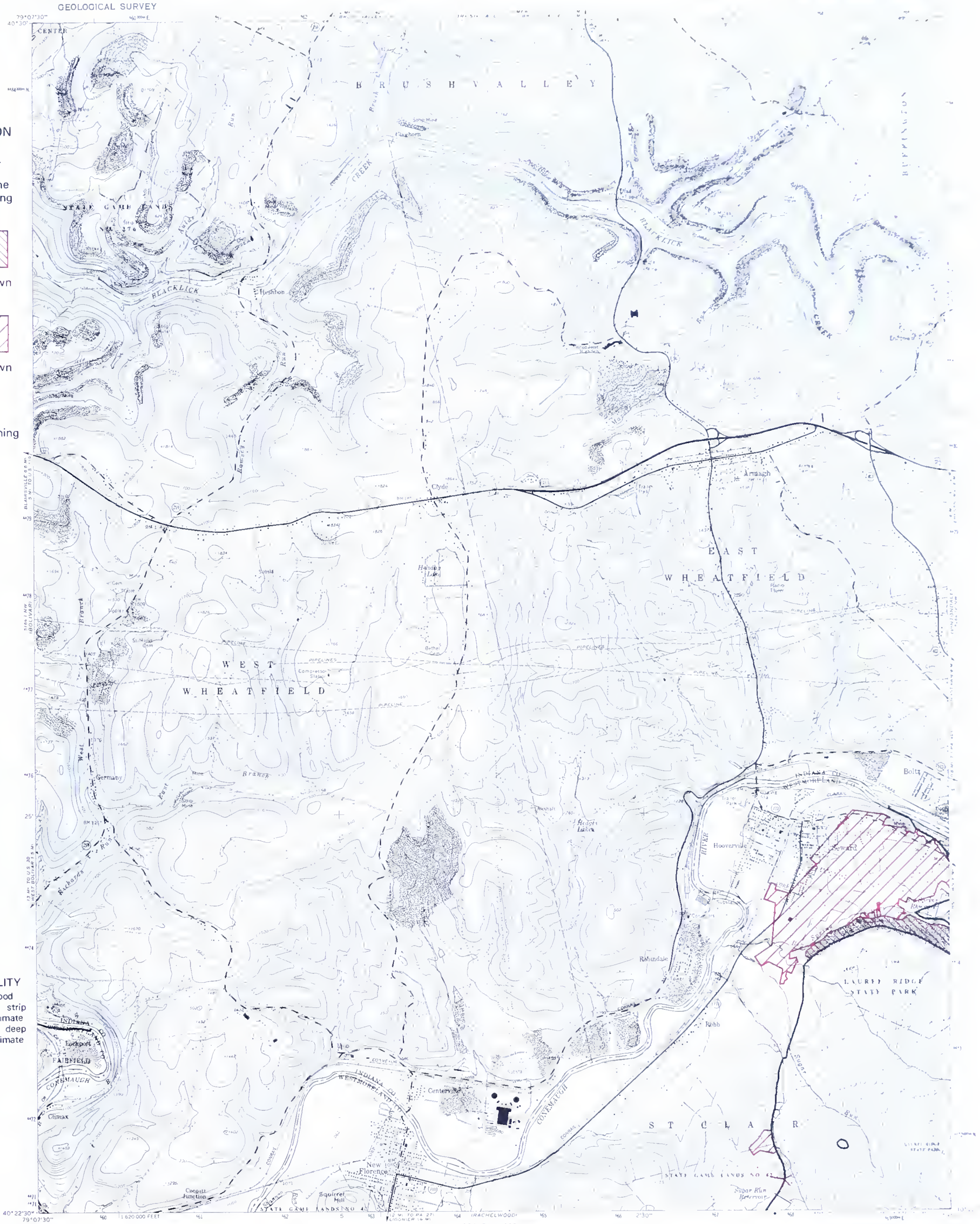
EXPLANATION

Crop line of the Lower Kittanning coal

▨ Extent of known strip mining

▨ Extent of known deep mining

Deep-mine opening



MAP RELIABILITY

Coal crop line—good
Limits of known strip mining—approximate
Limits of known deep mining—approximate

SOURCES

Crop line by V. W. Skema based on structure contours compiled from unpublished data and extended from adjacent area (Bragonier, W. A., Glover, A. D., and Phillips, J. G., compilers (in preparation), *Coal resources of Indiana County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report).

Limits of strip mining based on interpretation of topographic map.

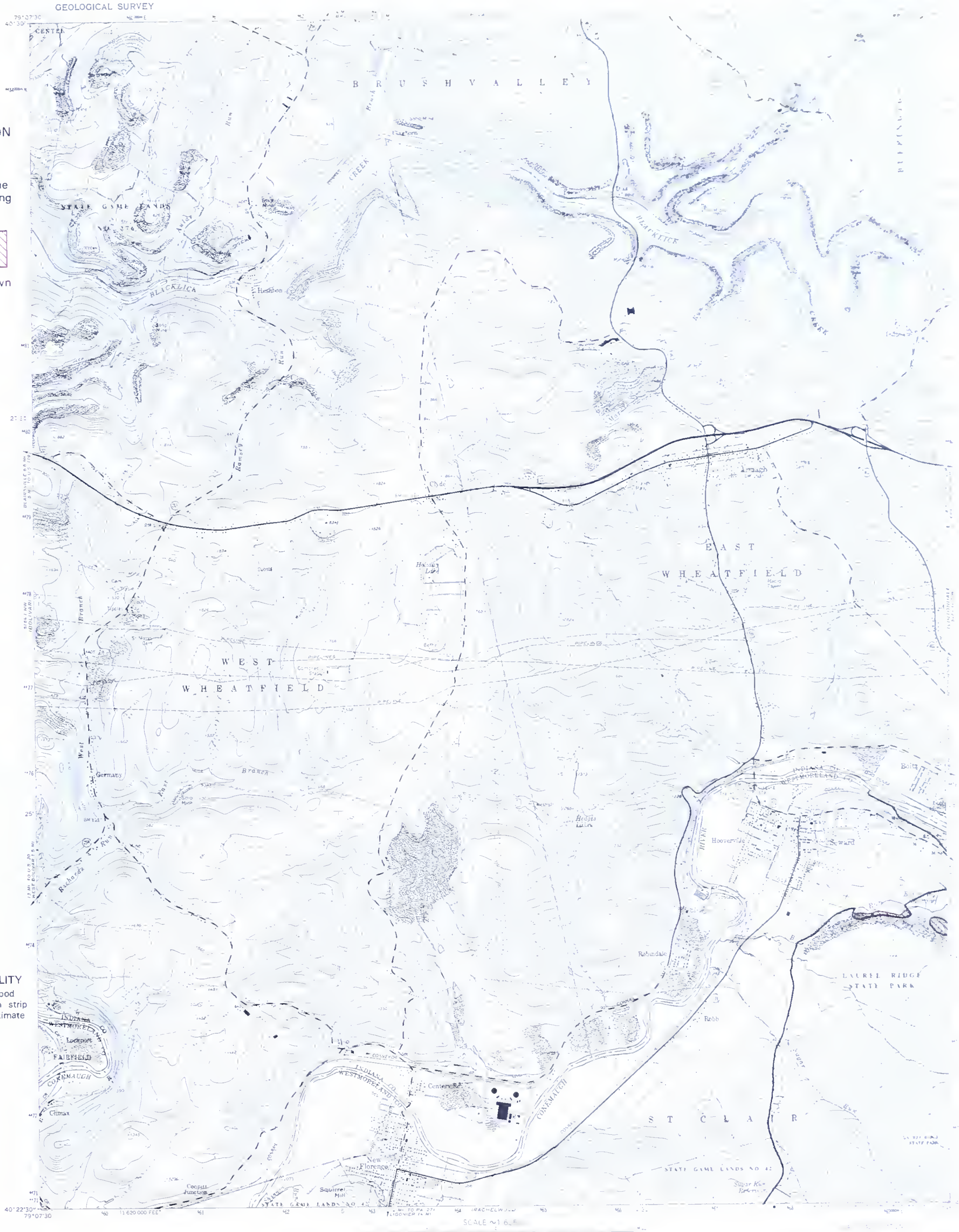
Limits of deep mining from unpublished mine maps.

Location of deep-mine opening from unpublished mine maps.

NEW FLORENCE

CROP LINE AND MINED-OUT AREAS OF THE LOWER KITTANNING COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



EXPLANATION

〰 Crop line of the Lower Kittanning rider coal

▨ Extent of known strip mining

MAP RELIABILITY

Coal crop line—good
Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Lower Kittanning coal compiled from unpublished data and extended from adjacent area (Bragonier, W. A., Glover, A. D., and Phillips, J. G., compilers (in preparation), *Coal resources of Indiana County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report).
Limits of strip mining based on interpretation of topographic map.

NEW FLORENCE

CROP LINE AND MINED-OUT AREAS OF THE
LOWER KITTANNING RIDER COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

CROP LINES

bc — Brush Creek coal

mh — Mahoning coal

uf — Upper Freeport coal

uk — Upper Kittanning coal

mk — Middle Kittanning coal

lkr — Lower Kittanning rider coal

lk — Lower Kittanning coal

cl — Clarion coal

bk — Brookville coal

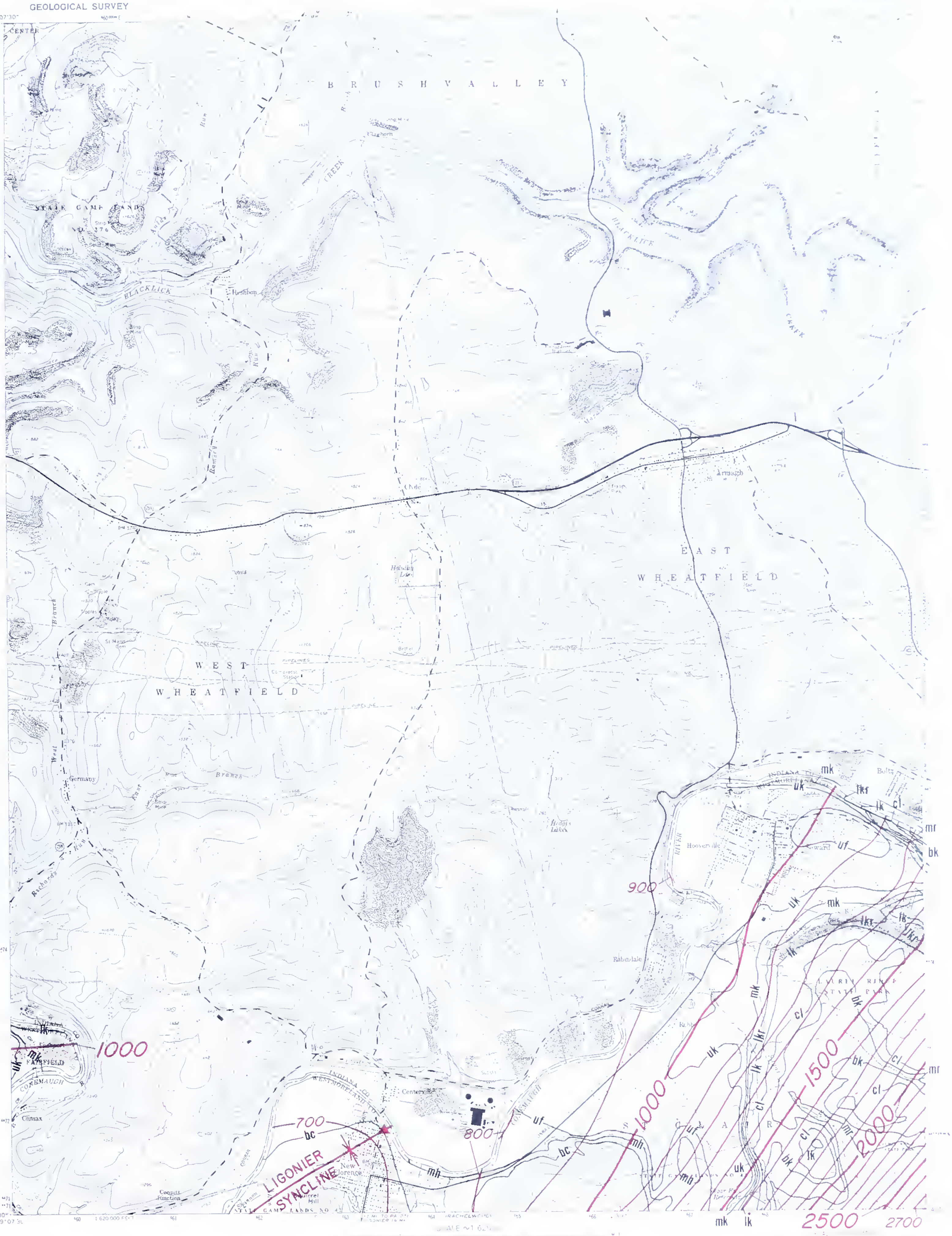
mr — Mercer coal

Syncline
Showing axial-plane trace and direction of plunge

—2000—
Structure contour
Altitude of the base of the Lower Kittanning coal, in feet above mean sea level. Contour interval 100 feet.

MAP RELIABILITY

Coal crop lines—poor to good
Structure contours—poor to good



SOURCES

Crop lines by V. W. Skema based on structure contours and intervals from structure contours.
Structure contours compiled by V. W. Skema from unpublished data and contours extended from adjacent area (Bragonier, W. A., Glover, A. D., and Phillips, J. G., compilers (in preparation), *Coal resources of Indiana County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*. Pennsylvania Geological Survey, 4th ser., Mineral Resource Report).

NEW FLORENCE

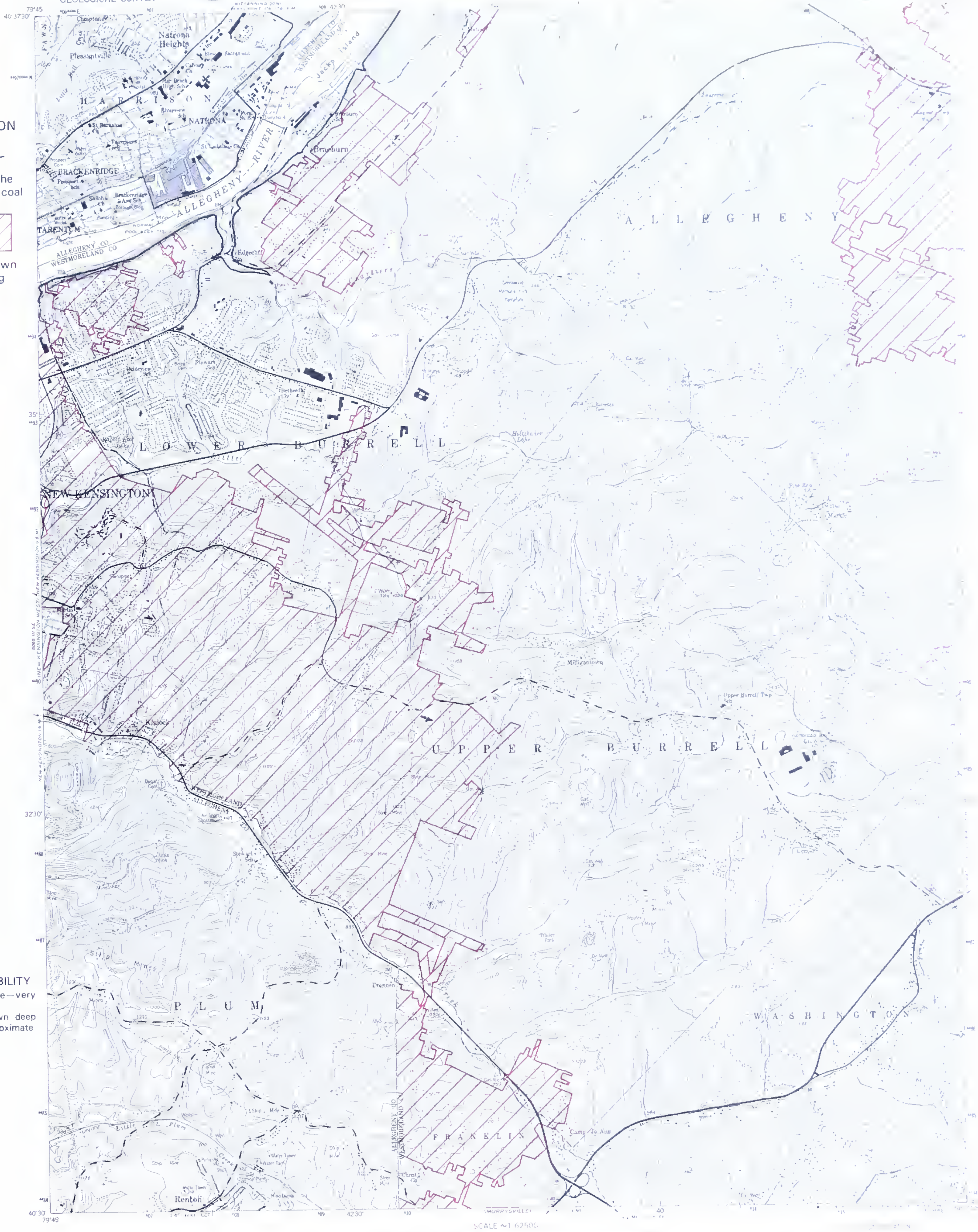
COAL CROP LINES AND STRUCTURE CONTOURS

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

Crop line of the Upper Freeport coal

▨ Extent of known deep mining



MAP RELIABILITY

Coal crop line—very good

Limits of known deep mining—approximate

SOURCES

Crop line by V. W. Skema based on structure contours compiled from unpublished data and extended from adjacent area (Dodge, C. H., compiler (1985), *Coal resources of Allegheny County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours,* Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 89, Pt. 1, p. 55).
Limits of deep mining from unpublished mine maps.

CROP LINE AND MINED-OUT AREAS OF THE
UPPER FREEPORT COAL

NEW KENSINGTON EAST

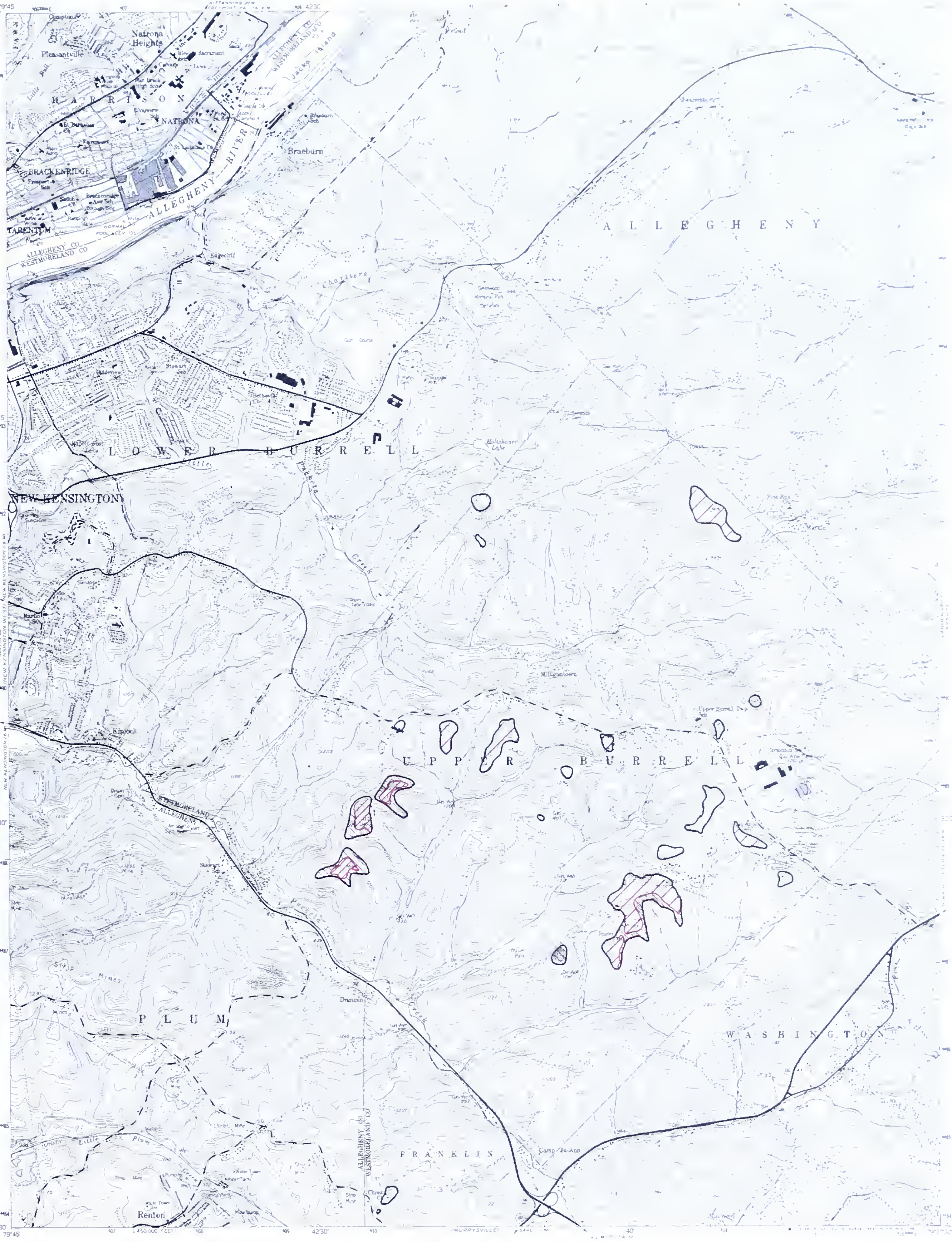
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

〰 Crop line of the Pittsburgh coal

▨ Extent of known strip mining

▨ Extent of known deep mining



MAP RELIABILITY

Coal crop line—very good
Limits of known strip mining—approximate
Limits of known deep mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Upper Freeport coal compiled from unpublished data and extended from adjacent area (Dodge, C. H., compiler (1985), *Coal resources of Allegheny County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours,* Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 89, Pt. 1, p. 55); and also based on locations of strip mines on topographic map.

Limits of strip mining based on interpretation of topographic map.

Limits of deep mining from Pennsylvania Department of Environmental Resources, Bureau of Mining and Reclamation (1978), unpublished map; and Hughes, H. H. (1933), *Freeport quadrangle—Geology and mineral resources,* Pennsylvania Geological Survey, 4th ser., Atlas 36, 272 p.

CROP LINE AND MINED-OUT AREAS OF THE PITTSBURGH COAL

NEW KENSINGTON EAST

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

CROP LINES

r — Redstone coal

p — Pittsburgh coal

bc — Brush Creek coal

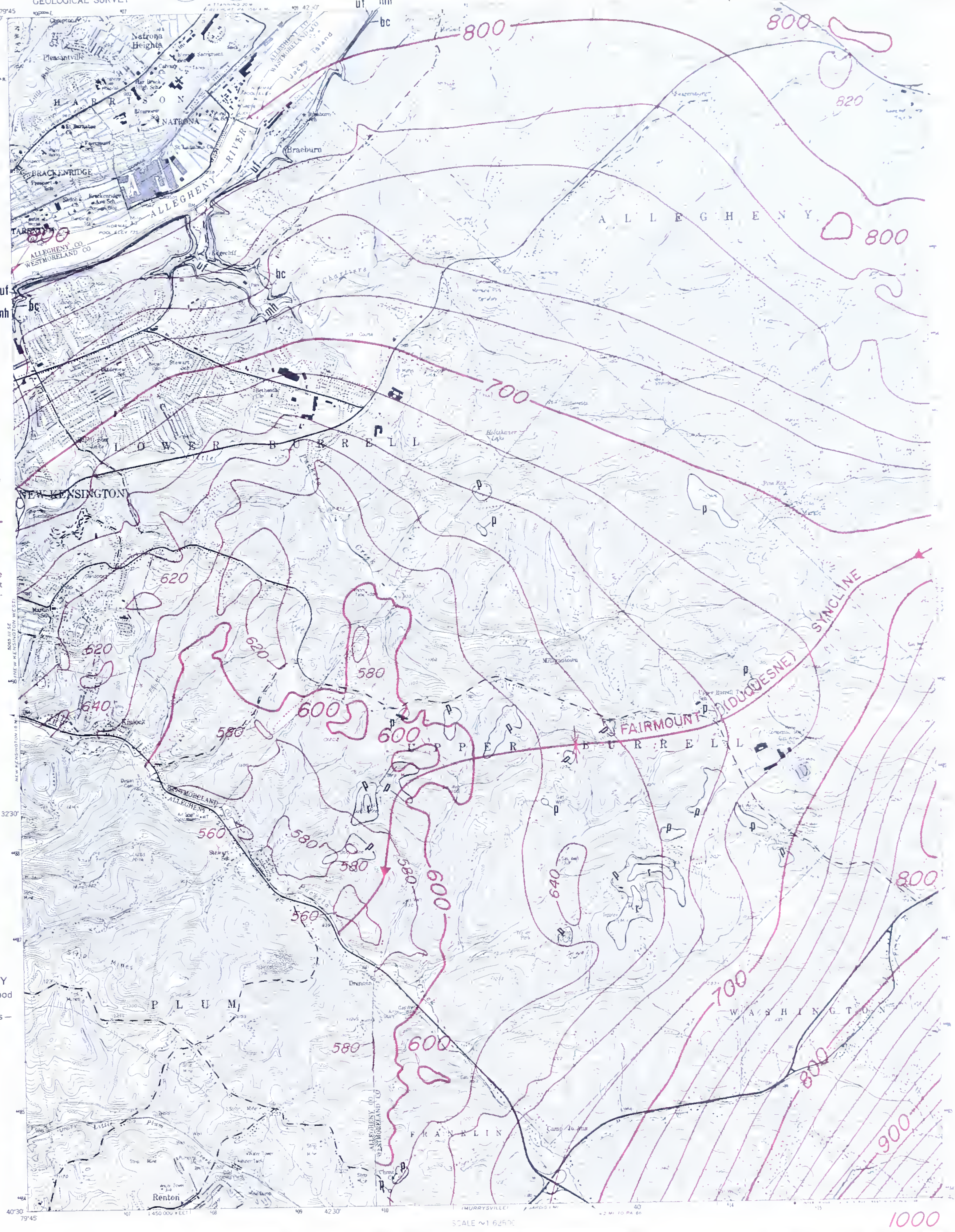
mh — Mahoning coal

uf — Upper Freeport coal

Syncline
Showing axial-plane trace and direction of plunge.

800 — Structure contour
Altitude of the base of the Upper Freeport coal, in feet above mean sea level. Contour interval 20 feet.

MAP RELIABILITY
Coal crop lines—good to very good
Structure contours—good to very good



UTM GRID AND 1979 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

SOURCES

Crop lines by V. W. Skema based on structure contours and intervals from structure contours.

Structure contours compiled by V. W. Skema from unpublished data and contours extended from adjacent area (Dodge, C. H., compiler (1985), *Coal resources of Allegheny County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours,* Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 89, Pt. 1, p. 55).

NEW KENSINGTON EAST

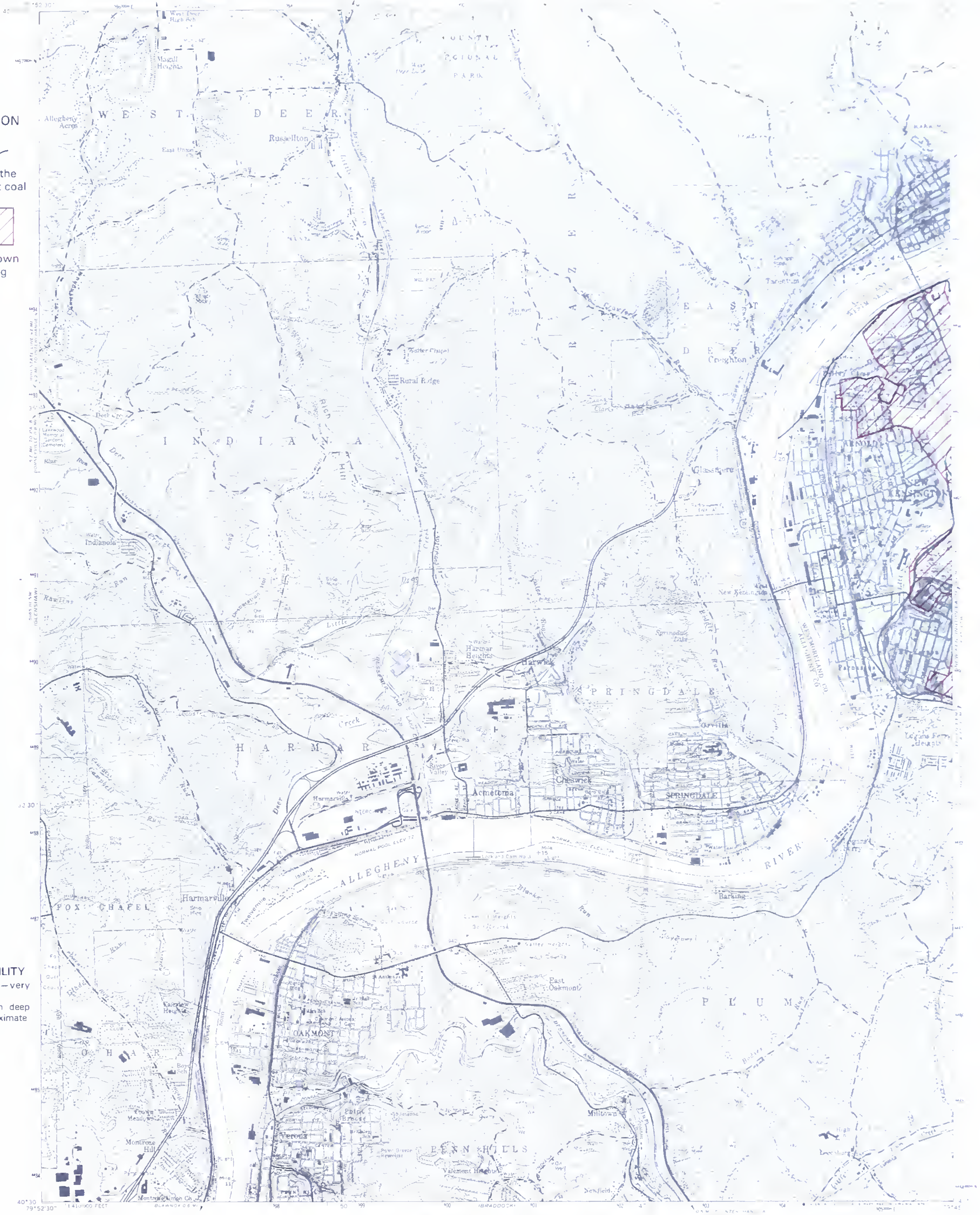
COAL CROP LINES AND STRUCTURE CONTOURS

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

Crop line of the Upper Freeport coal

▨ Extent of known deep mining



MAP RELIABILITY

Coal crop line—very good

Limits of known deep mining—approximate

SOURCES

Crop line by V. W. Skema based on structure contours compiled from unpublished mine maps and extended from adjacent area (Dodge, C. H., compiler (1985), *Coal resources of Allegheny County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 89, Pt. 1, p. 59).
Limits of deep mining from unpublished mine maps.

CROP LINE AND MINED-OUT AREAS OF THE UPPER FREEPORT COAL

NEW KENSINGTON WEST

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

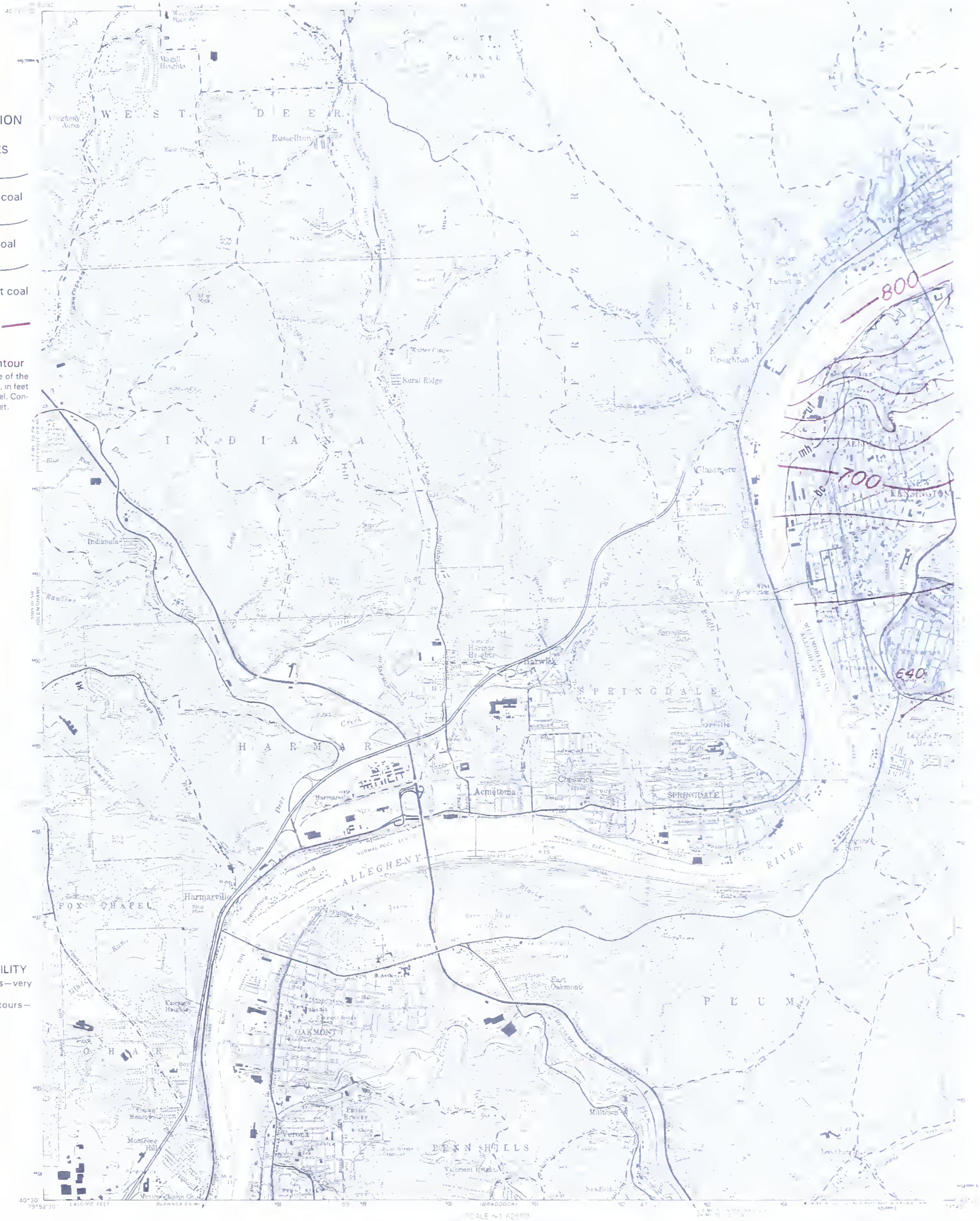
CROP LINES

——bc——
Brush Creek coal

——mh——
Mahoning coal

——uf——
Upper Freeport coal

——800——
Structure contour
Altitude of the base of the Upper Freeport coal, in feet above mean sea level. Contour interval 20 feet.



MAP RELIABILITY
Coal crop lines—very good
Structure contours—very good

SOURCES
Crop lines by V. W. Skema based on structure contours and intervals from structure contours.
Structure contours compiled by V. W. Skema from unpublished mine maps and contours extended from adjacent area (Dodge, C. H., compiler (1985), *Coal resources of Allegheny County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours,* Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 89, Pt. 1, p. 59).

SCALE 1:62500

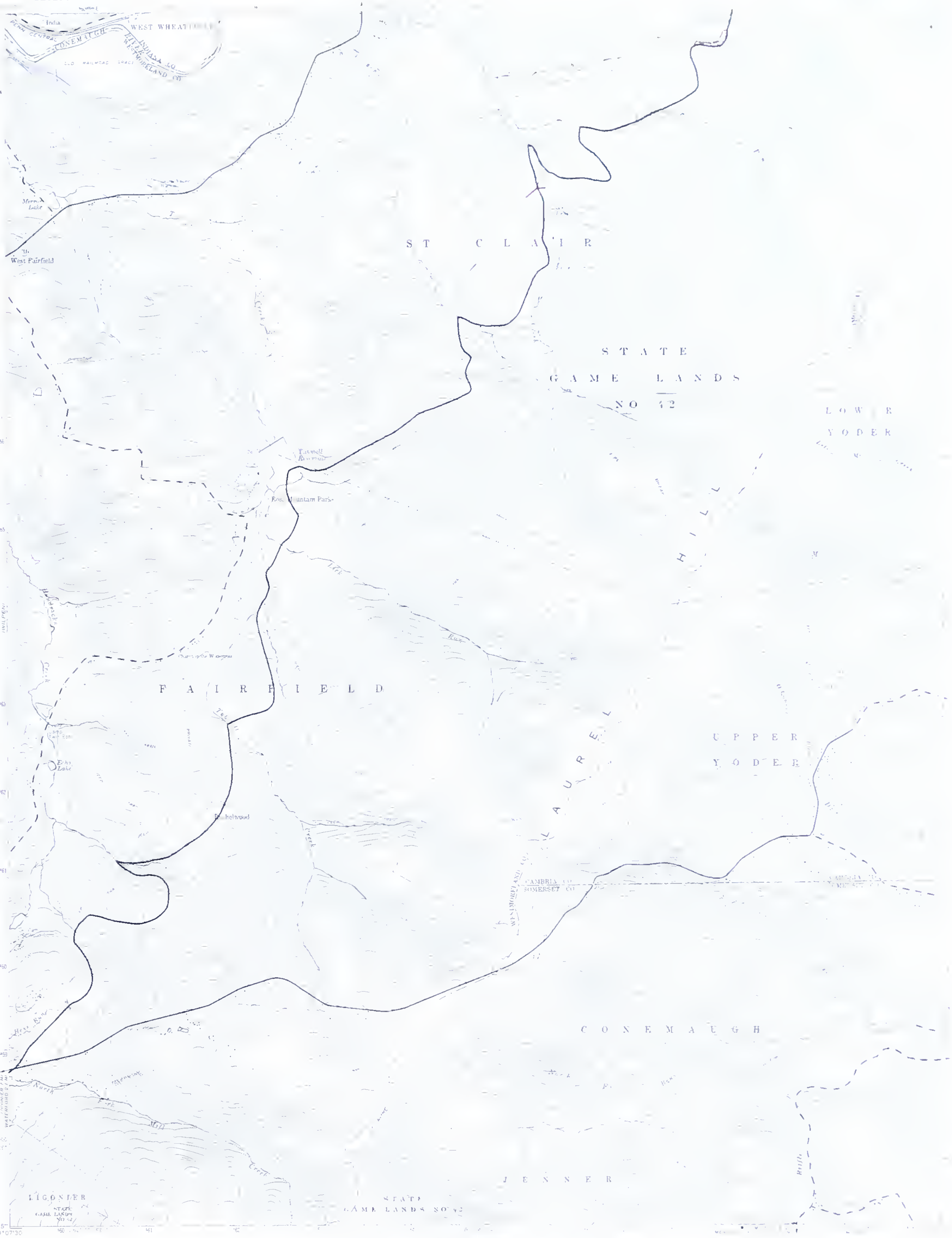
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

UTM GRID AND 1979 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

COAL CROP LINES AND STRUCTURE CONTOURS

NEW KENSINGTON WEST

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



EXPLANATION

Crop line of the Upper Kittanning coal

▨ Extent of known strip mining

Deep-mine opening

MAP RELIABILITY

Coal crop line—fair to good
Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Lower Kittanning coal compiled from unpublished data and modified from Shaffner, M. N. (1958), *Geology and mineral resources of the New Florence quadrangle, Pennsylvania*, Pennsylvania Geological Survey, 4th ser., Atlas 57, 165 p.
Limits of strip mining based on interpretation of topographic map.
Location of deep-mine opening from Shaffner (1958).

RACHELWOOD

CROP LINE AND MINED-OUT AREAS OF THE
UPPER KITTANNING COAL

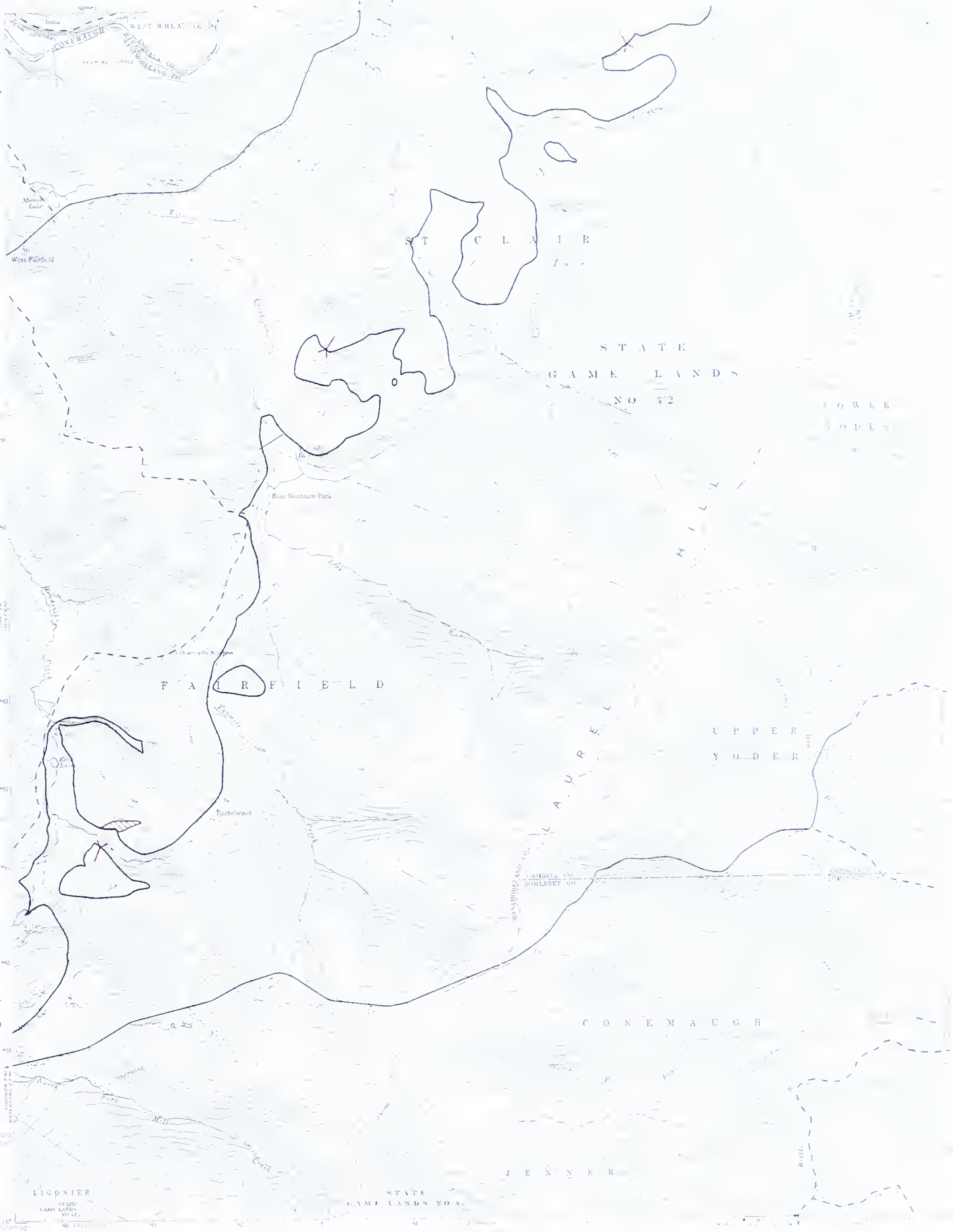
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

Crop line of the Upper Freeport coal

▨ Extent of known strip mining

Deep-mine opening



MAP RELIABILITY
Coal crop line—fair to good
Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Lower Kittanning coal compiled from unpublished data and modified from Shaffner, M. N. (1958), *Geology and mineral resources of the New Florence quadrangle, Pennsylvania*, Pennsylvania Geological Survey, 4th ser., Atlas 57, 165 p.
Limits of strip mining from Shaffner (1958) and interpretation of topographic map.
Locations of deep-mine openings from Shaffner (1958).

RACHELWOOD

CROP LINE AND MINED-OUT AREAS OF THE
UPPER FREEPORT COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

CROP LINES

bc — Brush Creek coal

mh — Mahoning coal

uf — Upper Freeport coal

uk — Upper Kittanning coal

mk — Middle Kittanning coal

lkr — Lower Kittanning rider coal

lk — Lower Kittanning coal

cl — Clarion coal

bk — Brookville coal

mr — Mercer coal

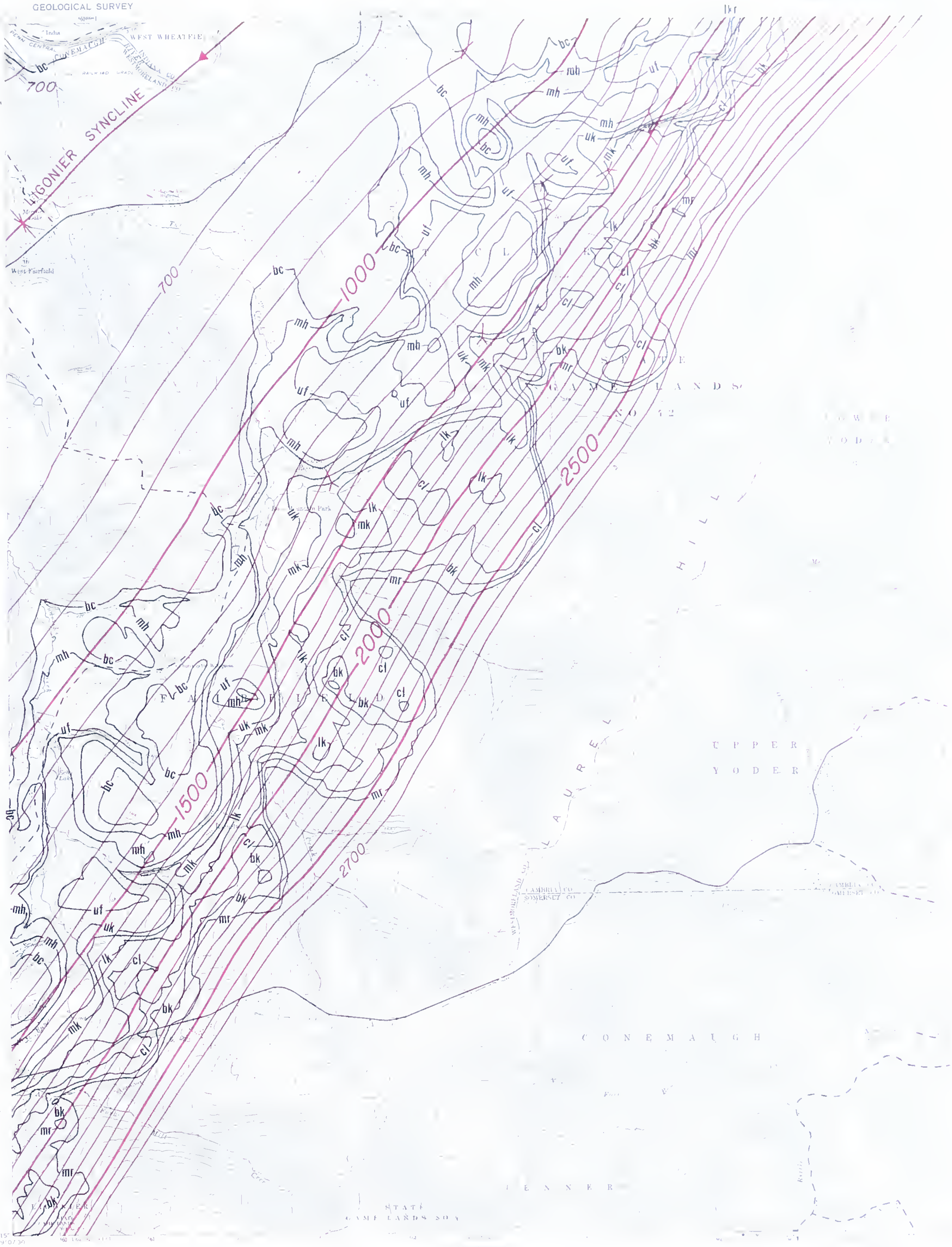
Syncline
Showing axial-plane trace and direction of plunge.

1000 — Structure contour
Altitude of the base of the Lower Kittanning coal, in feet above mean sea level. Contour interval 100 feet

Deep-mine opening

MAP RELIABILITY

Coal crop lines—poor to good
Structure contours—poor to good



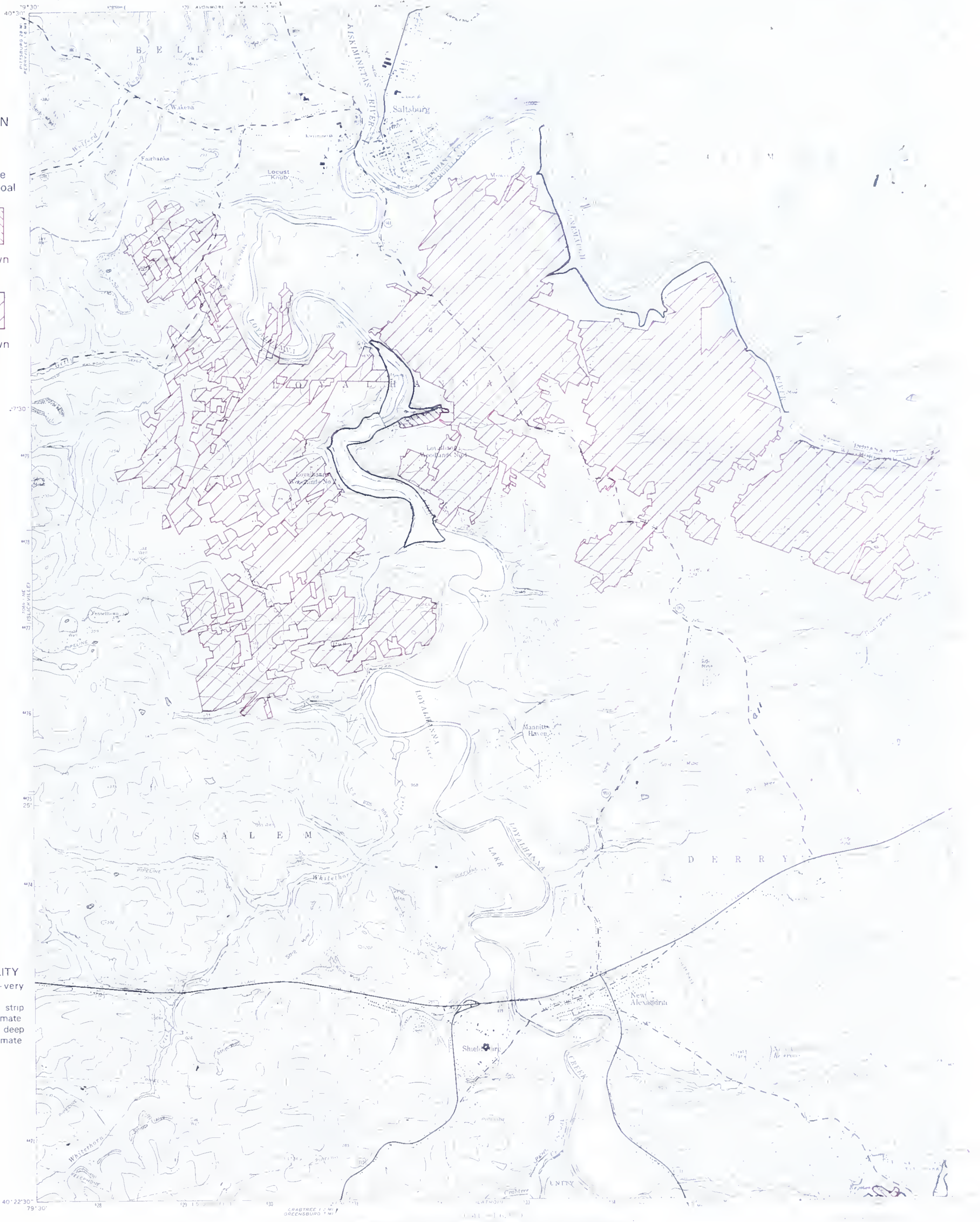
SOURCES

Crop lines by V. W. Skema based on structure contours and intervals from structure contours.
Structure contours compiled by V. W. Skema from unpublished data and modified from Shaffner, M. N. (1958), *Geology and mineral resources of the New Florence quadrangle, Pennsylvania*, Pennsylvania Geological Survey, 4th ser., Atlas 57, 165 p.
Locations of deep-mine openings from Shaffner (1958).

RACHELWOOD

COAL CROP LINES AND STRUCTURE CONTOURS

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



EXPLANATION

Crop line of the Upper Freeport coal

▨ Extent of known strip mining

▨ Extent of known deep mining

MAP RELIABILITY

Coal crop line—very good
Limits of known strip mining—approximate
Limits of known deep mining—approximate

SOURCES

Crop line by V. W. Skema based on structure contours compiled from unpublished data and extended from adjacent area (Bragonier, W. A., Glover, A. D., and Phillips, J. G., compilers (in preparation), *Coal resources of Indiana County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report).
Limits of strip mining based on interpretation of topographic map and aerial photographs.
Limits of deep mining from unpublished mine maps.

CROP LINE AND MINED-OUT AREAS OF THE

UPPER FREEPORT COAL

SALTSBURG

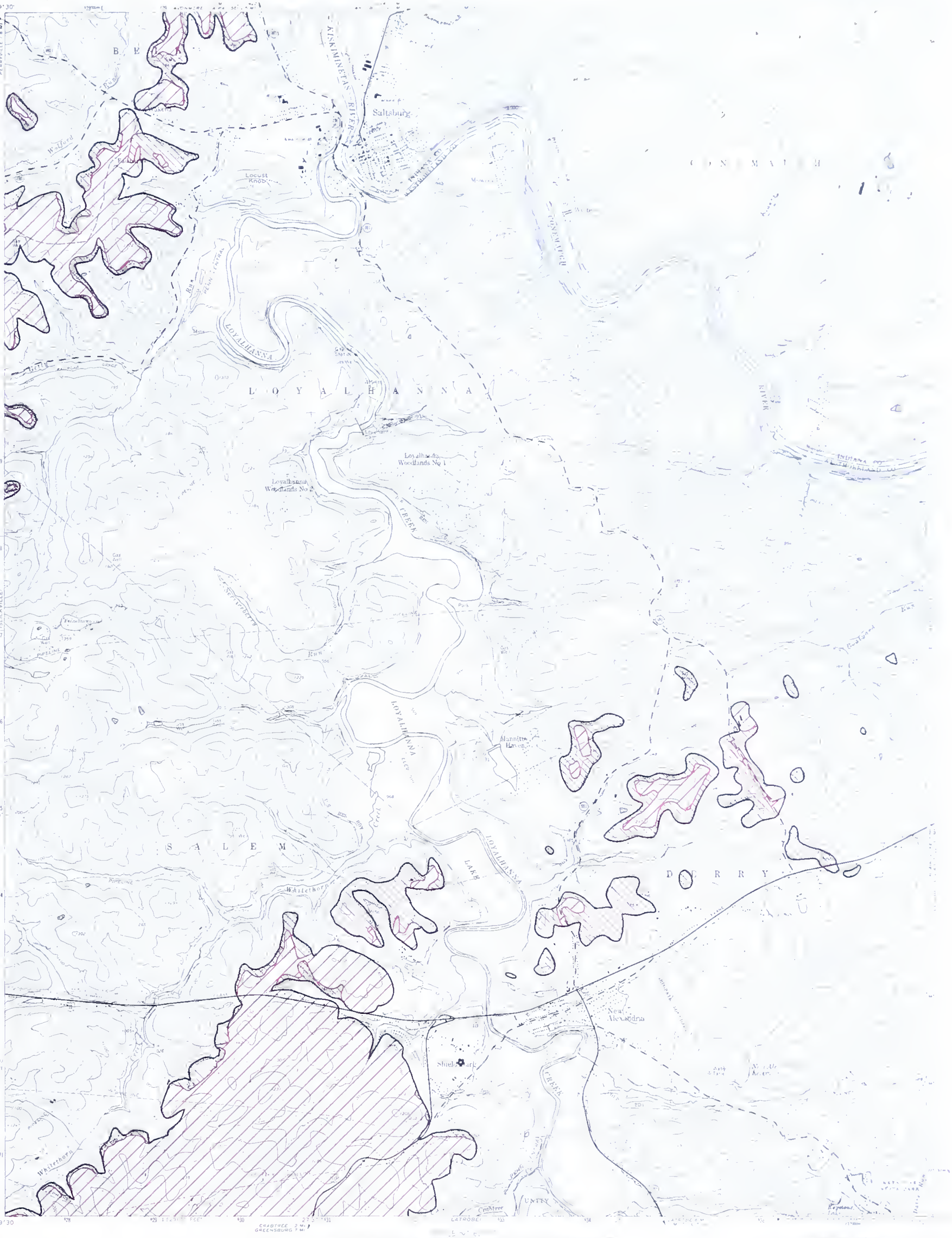
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

Crop line of the Pittsburgh coal

▨ Extent of known strip mining

▨ Extent of known deep mining



MAP RELIABILITY
Coal crop line—good
Limits of known strip mining—approximate
Limits of known deep mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Upper Freeport coal compiled from unpublished data and extended from adjacent area (Bragonier, W. A., Glover, A. D., and Phillips, J. G., compilers (in preparation), *Coal resources of Indiana County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report).
Limits of strip mining based on interpretation of topographic map and aerial photographs.
Limits of deep mining from unpublished mine maps.

CROP LINE AND MINED-OUT AREAS OF THE

PITTSBURGH COAL

SALTSBURG

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

CROP LINES

——s—— Sewickley coal

——r—— Redstone coal

——p—— Pittsburgh coal

——bc—— Brush Creek coal

——mh—— Mahoning coal

——uf—— Upper Freeport coal

——uk—— Upper Kittanning coal

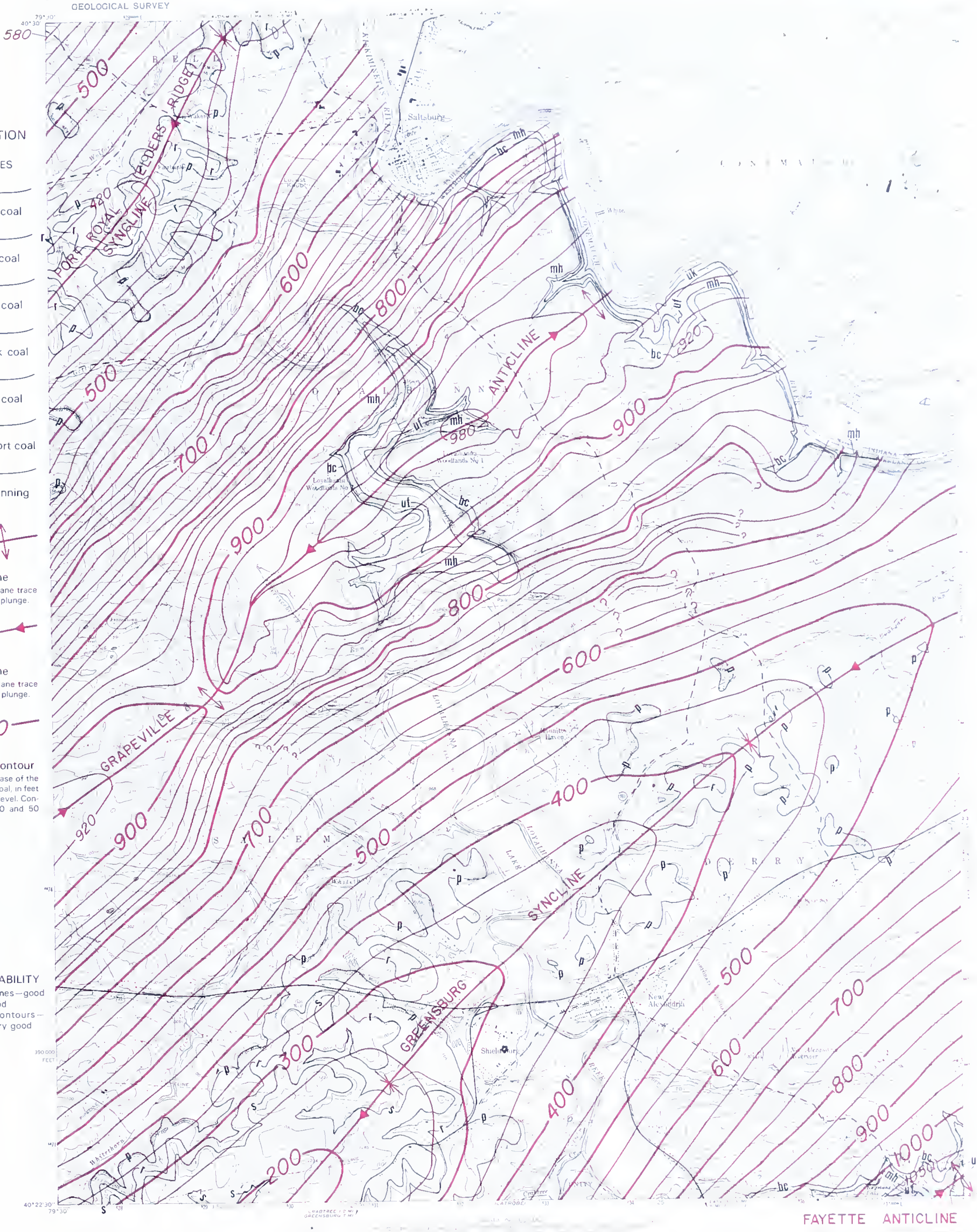
Anticline
Showing axial-plane trace and direction of plunge.

Syncline
Showing axial-plane trace and direction of plunge.

—800—

Structure contour
Altitude of the base of the Upper Freeport coal, in feet above mean sea level. Contour intervals 20 and 50 feet

MAP RELIABILITY
Coal crop lines—good to very good
Structure contours—good to very good



SOURCES

Crop lines by V. W. Skema based on structure contours and intervals from structure contours.
Structure contours compiled by V. W. Skema from unpublished data and contours extended from adjacent area (Bragonier, W. A., Glover, A. D., and Phillips, J. G., compilers (in preparation), *Coal resources of Indiana County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report).

SALTSBURG

COAL CROP LINES AND STRUCTURE CONTOURS

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

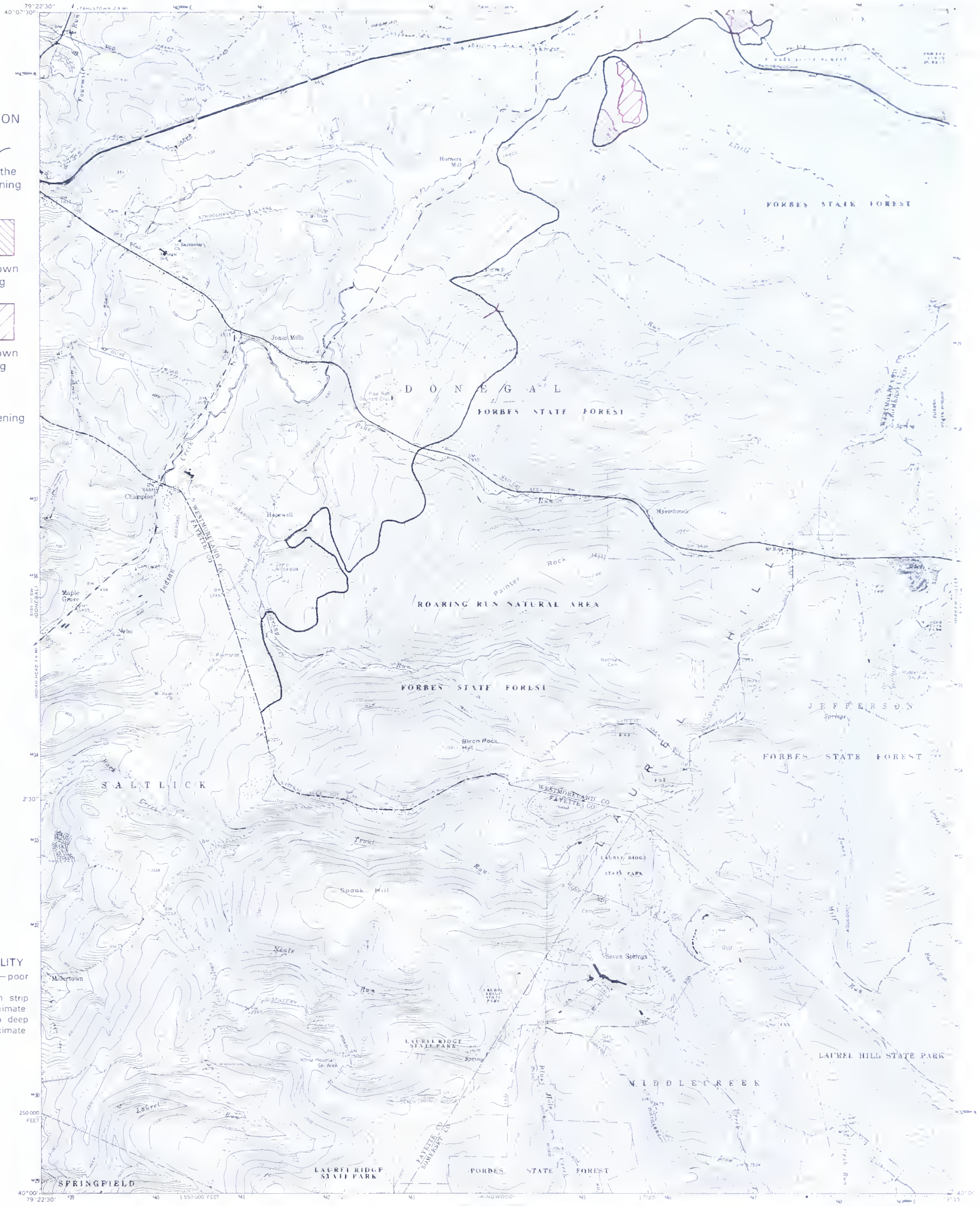
EXPLANATION

〰 Crop line of the Middle Kittanning coal

▨ Extent of known strip mining

▨ Extent of known deep mining

⅄ Deep-mine opening



MAP RELIABILITY

Coal crop line—poor to good
Limits of known strip mining—approximate
Limits of known deep mining—approximate

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Upper Freeport coal compiled from unpublished data and extended from adjacent area (Shaulis, J. R., compiler (1985), *Coal resources of Fayette County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours,* Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 91, Pt. 1, p. 72).

Limits of strip mining based on interpretation of topographic map and field checking.

Limits of deep mining from unpublished mine maps.

Locations of deep-mine openings from Shaffner, M. N. (1963), *Geology and mineral resources of the Donegal quadrangle, Pennsylvania,* Pennsylvania Geological Survey, 4th ser., Atlas 48, 116 p.

CROP LINE AND MINED-OUT AREAS OF THE
MIDDLE KITTANNING COAL

SEVEN SPRINGS

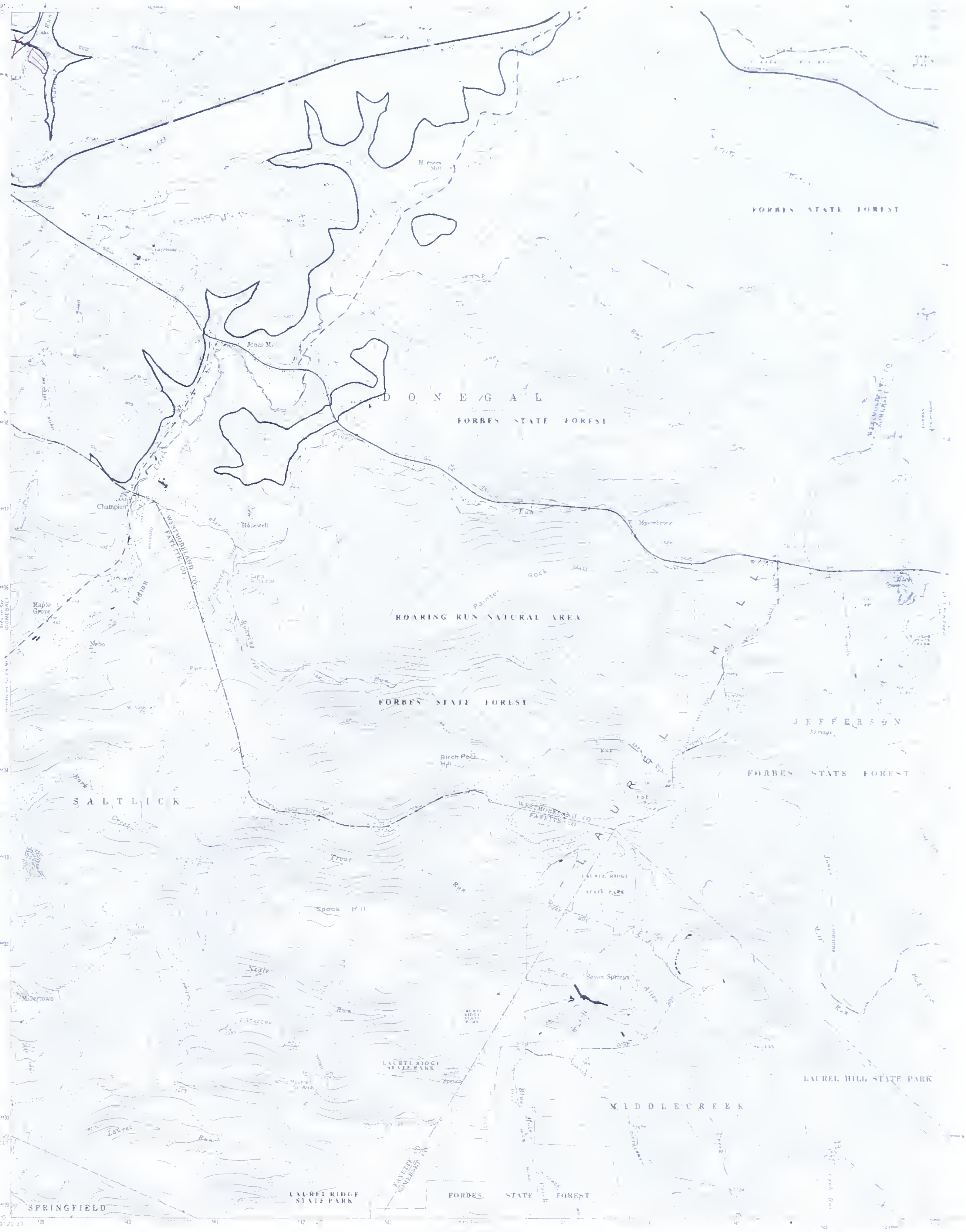
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

∼ Crop line of the Mahoning coal

▨ Extent of known strip mining

Y Deep-mine opening



MAP RELIABILITY

Coal crop line—fair to good

Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Upper Freeport coal compiled from unpublished data and extended from adjacent area (Shaulis, J. R., compiler (1985), *Coal resources of Fayette County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours,* Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 91, Pt. 1, p. 72).

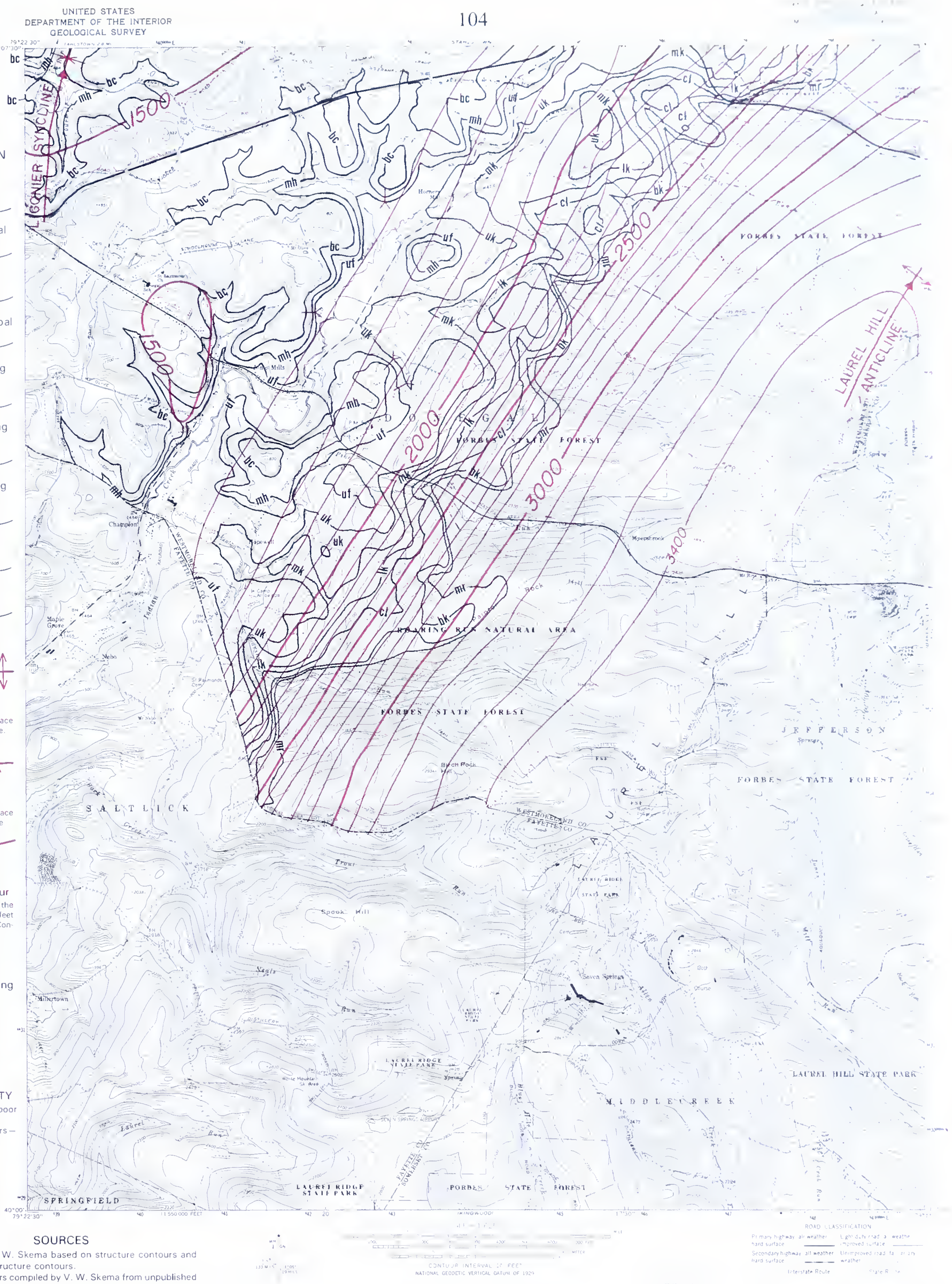
Limits of strip mining based on interpretation of topographic map.

Location of deep-mine opening from Shaffner, M. N. (1963), *Geology and mineral resources of the Donegal quadrangle, Pennsylvania,* Pennsylvania Geological Survey, 4th ser., Atlas 48, 116 p.

CROP LINE AND MINED-OUT AREAS OF THE

MAHONING COAL

SEVEN SPRINGS



EXPLANATION

CROP LINES

bc — Brush Creek coal

mh — Mahoning coal

uf — Upper Freeport coal

uk — Upper Kittanning coal

mk — Middle Kittanning coal

lk — Lower Kittanning coal

cl — Clarion coal

bk — Brookville coal

mr — Mercer coal

Anticline
Showing axial-plane trace and direction of plunge.

Syncline
Showing axial-plane trace and direction of plunge

3000

Structure contour
Altitude of the base of the Upper Freeport coal, in feet above mean sea level. Contour interval 100 feet

Deep-mine opening

MAP RELIABILITY
Coal crop lines—poor to good
Structure contours—poor to good

SOURCES

Crop lines by V. W. Skema based on structure contours and intervals from structure contours.

Structure contours compiled by V. W. Skema from unpublished data and contours extended from adjacent area (Shaulis, J. R., compiler (1985), *Coal resources of Fayette County, Pennsylvania—Part 1, Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 91, Pt. 1, p. 72).

Locations of deep-mine openings from Shaffner, M. N. (1963), *Geology and mineral resources of the Donegal quadrangle, Pennsylvania*, Pennsylvania Geological Survey, 4th ser., Atlas 48, 116 p.

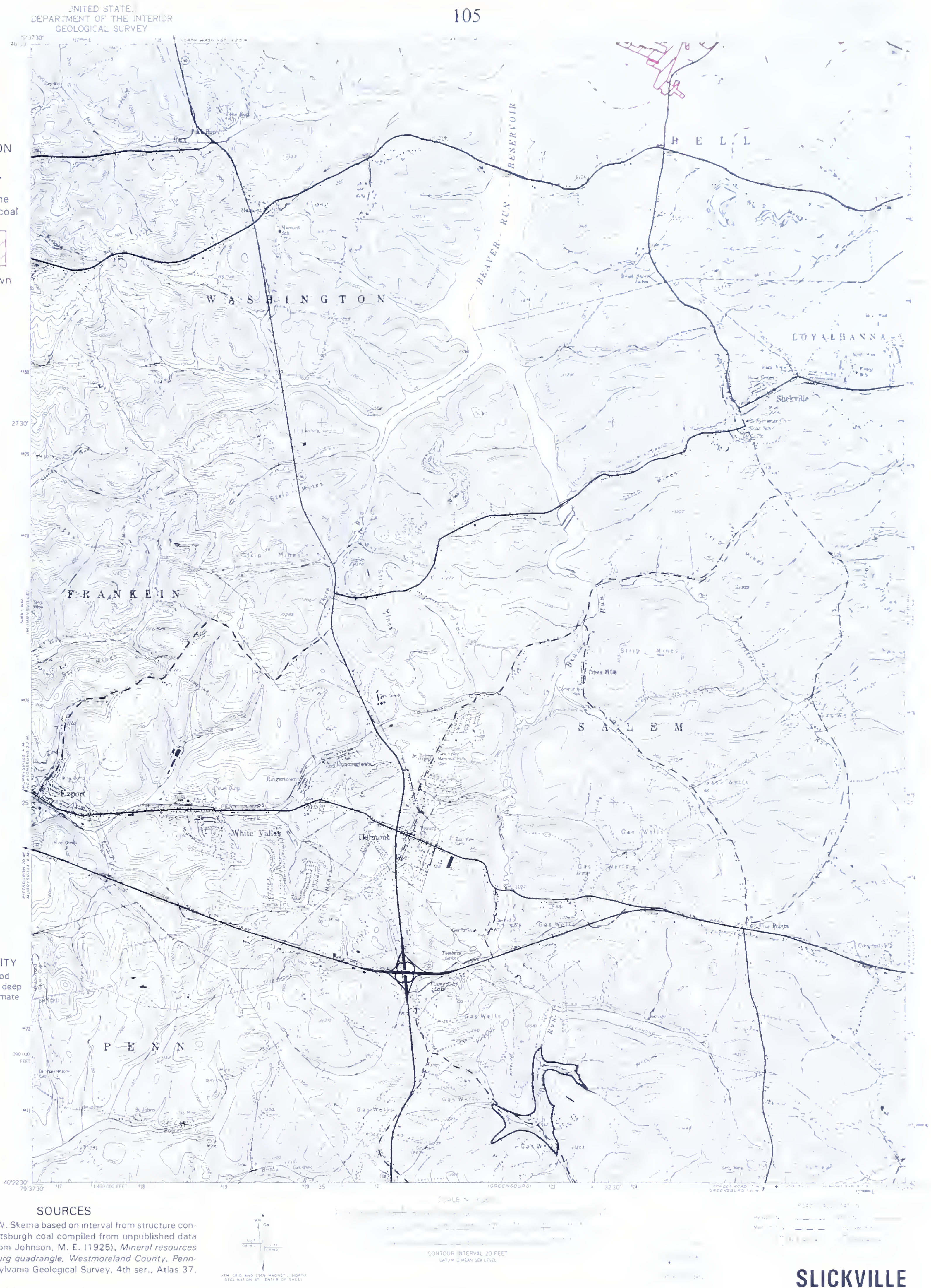
COAL CROP LINES AND STRUCTURE CONTOURS

SEVEN SPRINGS

EXPLANATION

〰 Crop line of the Upper Freeport coal

▨ Extent of known deep mining



MAP RELIABILITY

Coal crop line—good
Limits of known deep mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Pittsburgh coal compiled from unpublished data and modified from Johnson, M. E. (1925), *Mineral resources of the Greensburg quadrangle, Westmoreland County, Pennsylvania*, Pennsylvania Geological Survey, 4th ser., Atlas 37, 162 p.

Limits of deep mining from unpublished mine maps.

SLICKVILLE

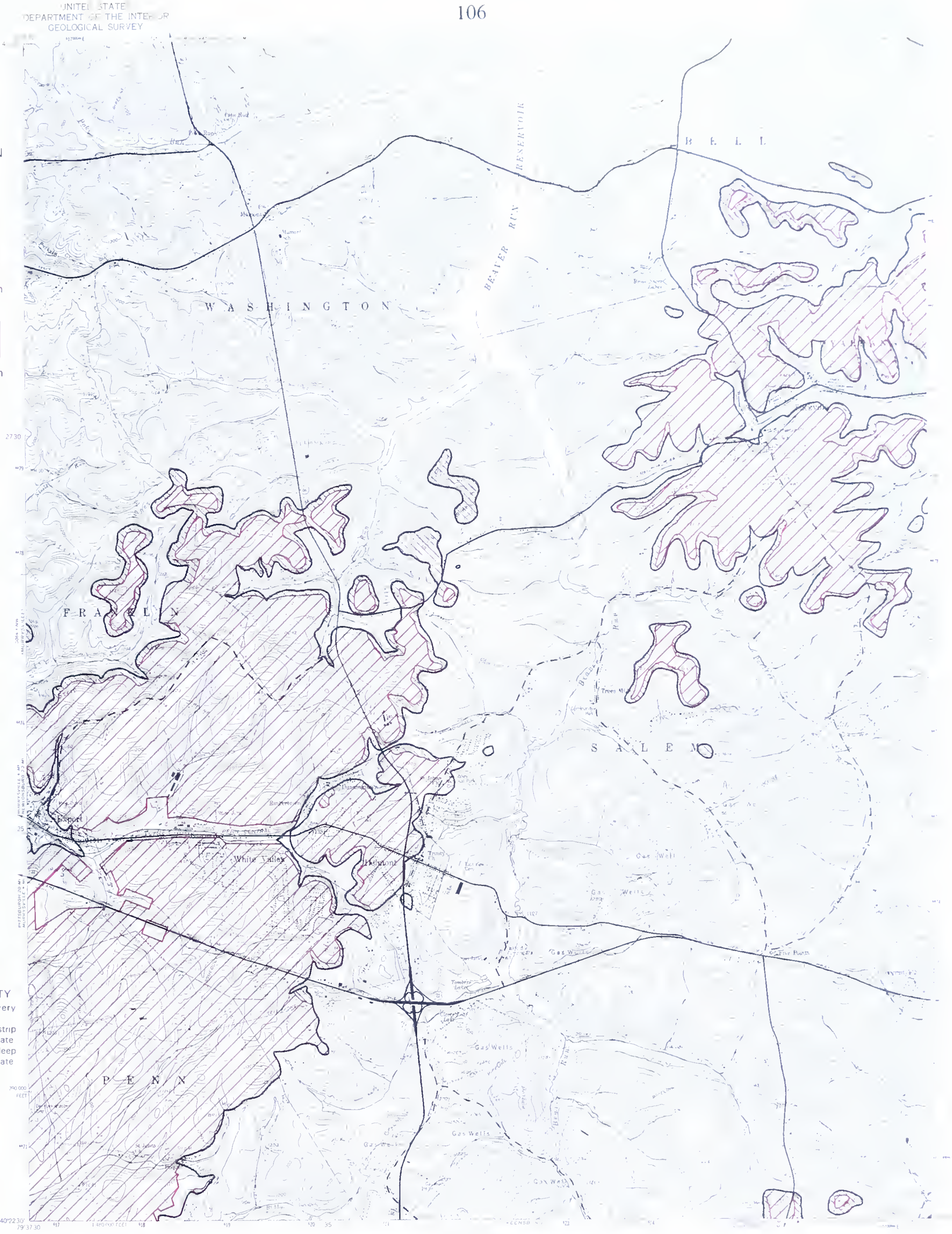
CROP LINE AND MINED-OUT AREAS OF THE UPPER FREEPORT COAL

EXPLANATION

Crop line of the Pittsburgh coal

▨ Extent of known strip mining

▨ Extent of known deep mining



MAP RELIABILITY

Coal crop line—very good

Limits of known strip mining—approximate

Limits of known deep mining—approximate

SOURCES

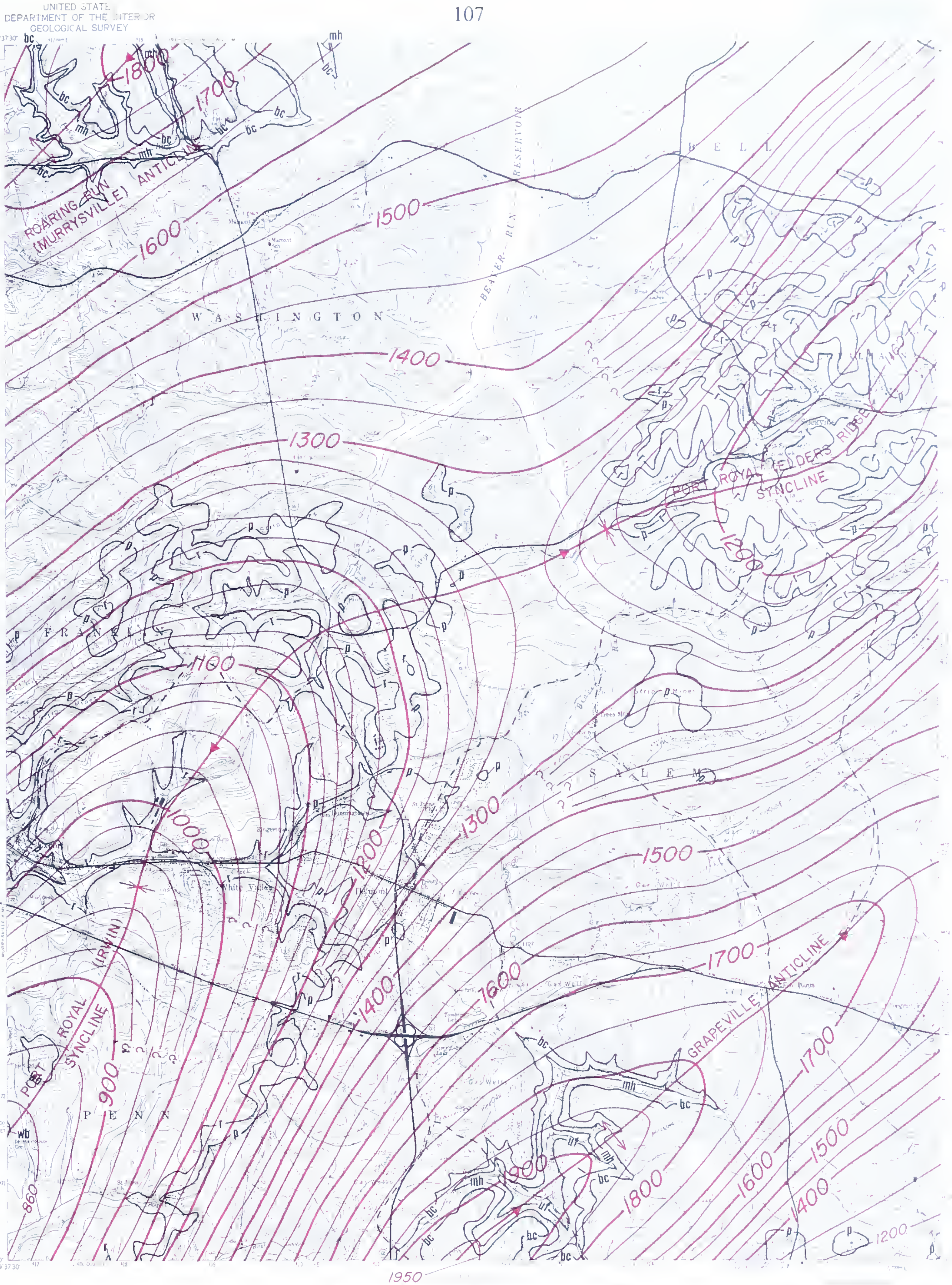
Crop line by V. W. Skema based on structure contours compiled from unpublished data and modified from Johnson, M. E. (1925), *Mineral resources of the Greensburg quadrangle, Westmoreland County, Pennsylvania*, Pennsylvania Geological Survey, 4th ser., Atlas 37, 162 p.

Limits of strip mining based on interpretation of topographic map and aerial photographs.

Limits of deep mining from unpublished mine maps.

CROP LINE AND MINED-OUT AREAS OF THE
PITTSBURGH COAL

SLICKVILLE



EXPLANATION

CROP LINES

—wb— Waynesburg coal

—r— Redstone coal

—p— Pittsburgh coal

—bc— Brush Creek coal

—mh— Mahoning coal

—uf— Upper Freeport coal

Anticline
Showing axial-plane trace and direction of plunge

Syncline
Showing axial-plane trace and direction of plunge

—1500—

Structure contour
Altitude of the base of the Pittsburgh coal, in feet above mean sea level. Contour intervals 20, 50, and 100 feet

MAP RELIABILITY
Coal crop lines—good to very good
Structure contours—good to very good

SOURCES

Crop lines by V. W. Skema based on structure contours and intervals from structure contours.
Structure contours compiled by V. W. Skema from unpublished data and modified from Johnson, M. E. (1925), *Mineral resources of the Greensburg quadrangle, Westmoreland County, Pennsylvania*, Pennsylvania Geological Survey, 4th ser., Atlas 37, 162 p.

SLICKVILLE

COAL CROP LINES AND STRUCTURE CONTOURS

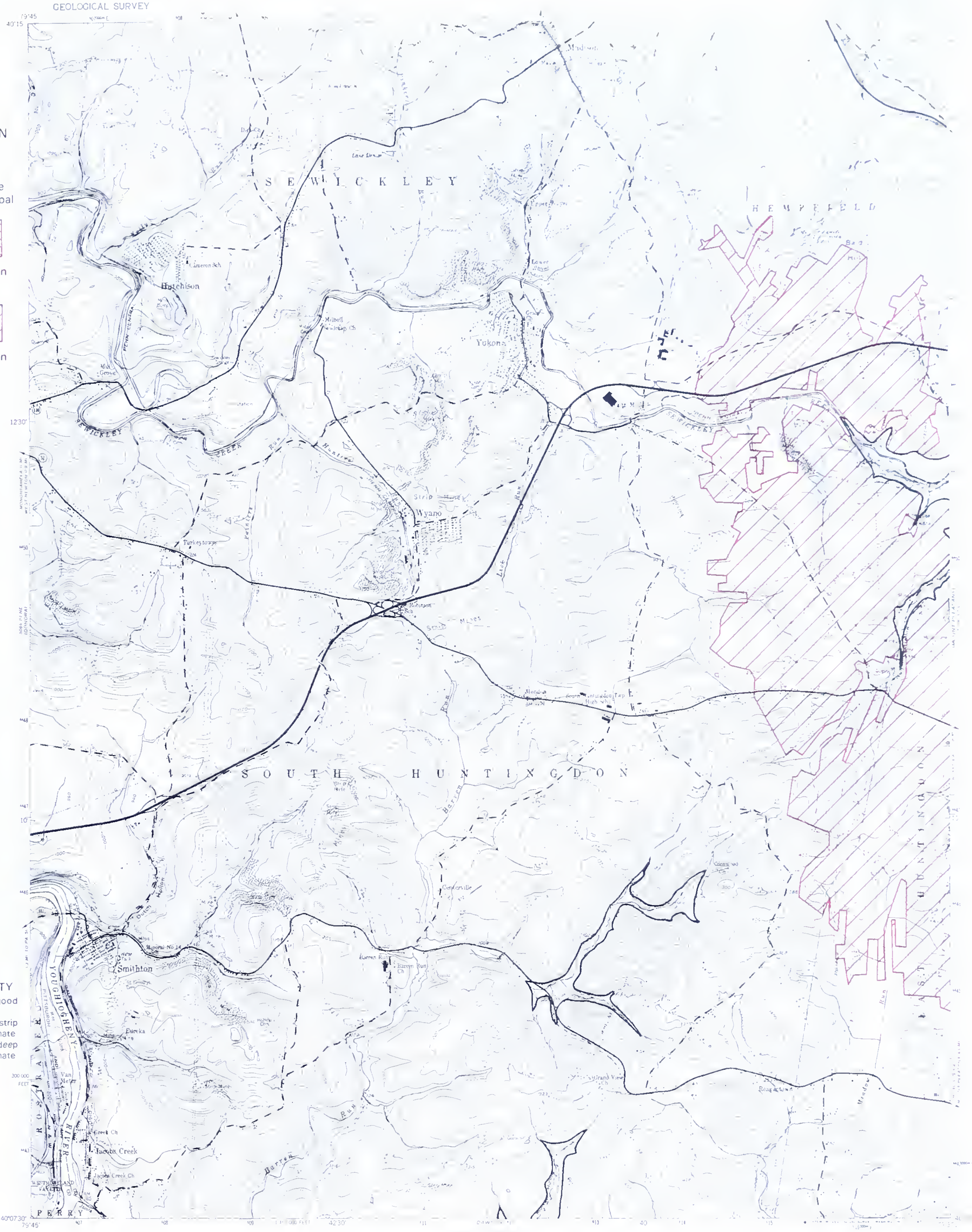
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

〰 Crop line of the Upper Freeport coal

▨ Extent of known strip mining

▨ Extent of known deep mining



MAP RELIABILITY

Coal crop line—good to very good

Limits of known strip mining—approximate

Limits of known deep mining—approximate

SOURCES

Crop line by V. W. Skema based on structure contours slightly modified from Sholes, M. A., Edmunds, W. E., and Skema, V. W. (1979), *The economic geology of the Upper Freeport coal in the New Stanton area of Westmoreland County, Pennsylvania: a model for coal exploration*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 75, 51 p.

Limits of strip mining based on interpretation of topographic map.

Limits of deep mining from Sholes and others (1979).

CROP LINE AND MINED-OUT AREAS OF THE
UPPER FREEPORT COAL

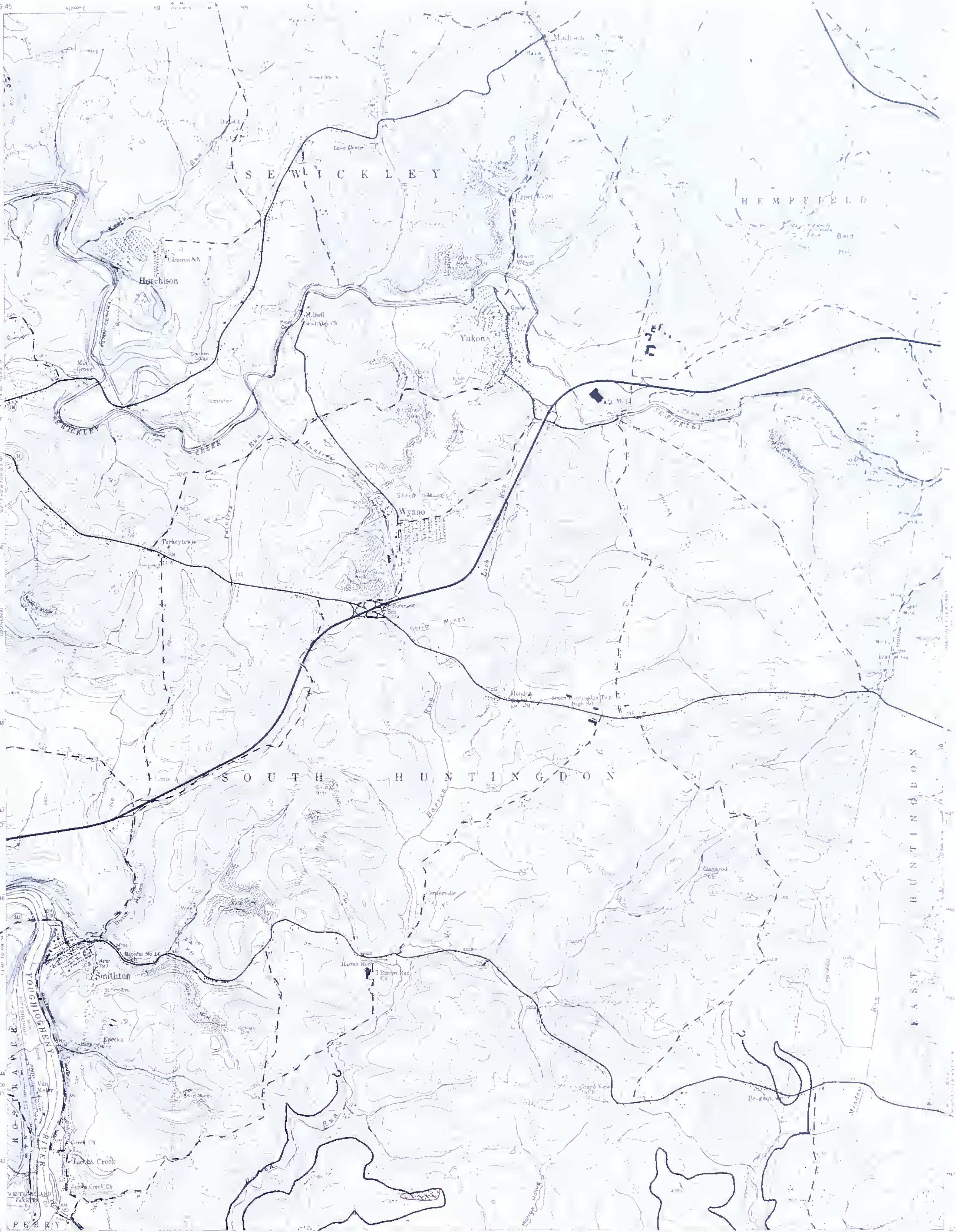
SMITHTON

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

〜 Crop line of the Lower Bakerstown coal

▨ Extent of known strip mining



MAP RELIABILITY

Coal crop line—good
Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Upper Freeport coal slightly modified from Sholes, M. A., Edmunds, W. E., and Skema, V. W. (1979), *The economic geology of the Upper Freeport coal in the New Stanton area of Westmoreland County, Pennsylvania: a model for coal exploration*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 75, 51 p.; and also based on location of strip mine on topographic map.

Limits of strip mining based on interpretation of topographic map.

CROP LINE AND MINED-OUT AREA OF THE

LOWER BAKERSTOWN COAL

SMITHTON

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

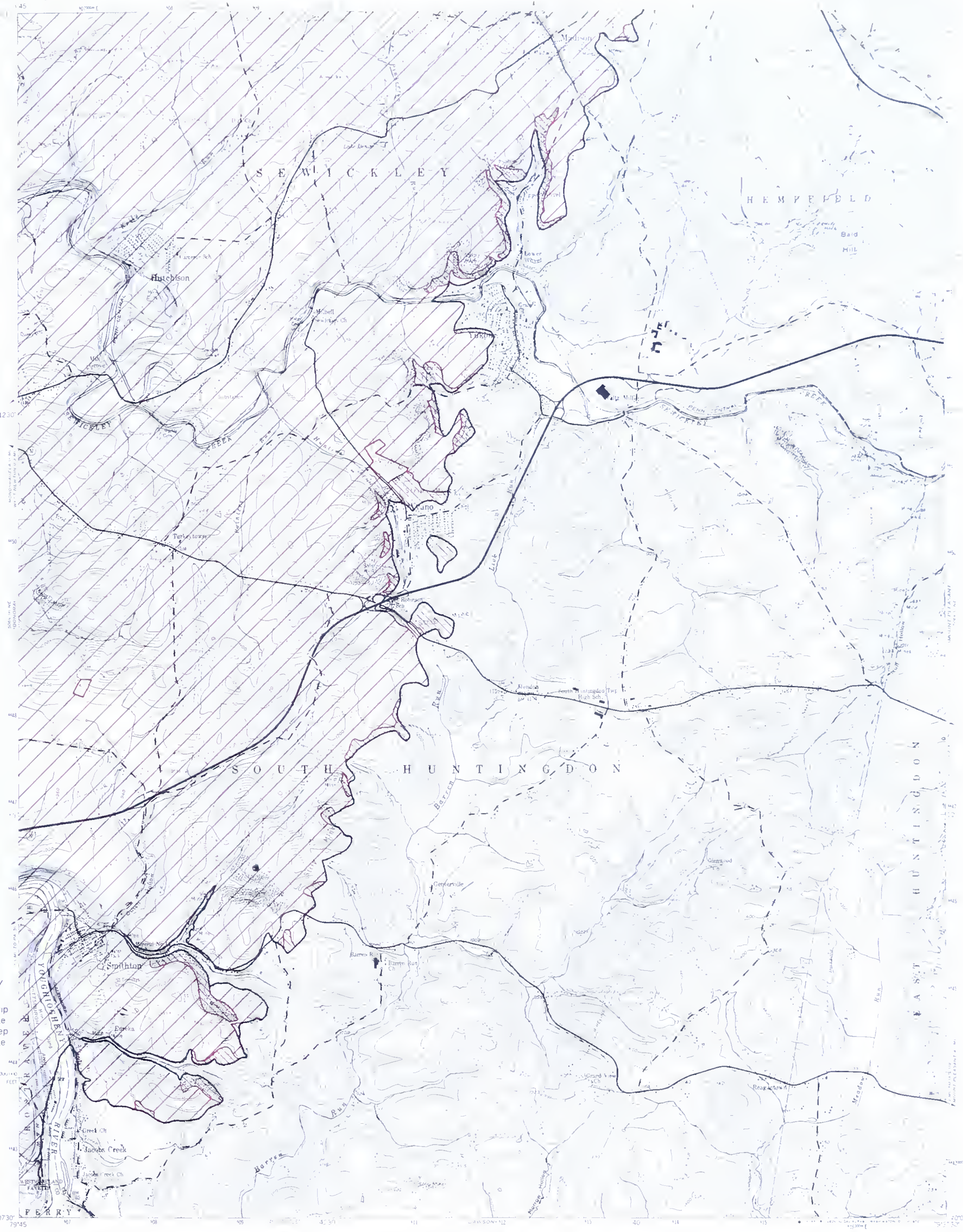
〜 Crop line of the Pittsburgh coal

▨ Extent of known strip mining

▨ Extent of known deep mining

MAP RELIABILITY

Coal crop line—good
Limits of known strip mining—approximate
Limits of known deep mining—approximate



SOURCES

Crop line by V. W. Skema based on structure contours compiled from unpublished data.
Limits of strip mining based on interpretation of topographic map and aerial photographs.
Limits of deep mining from unpublished mine maps

SMITHTON

CROP LINE AND MINED-OUT AREAS OF THE
PITTSBURGH COAL

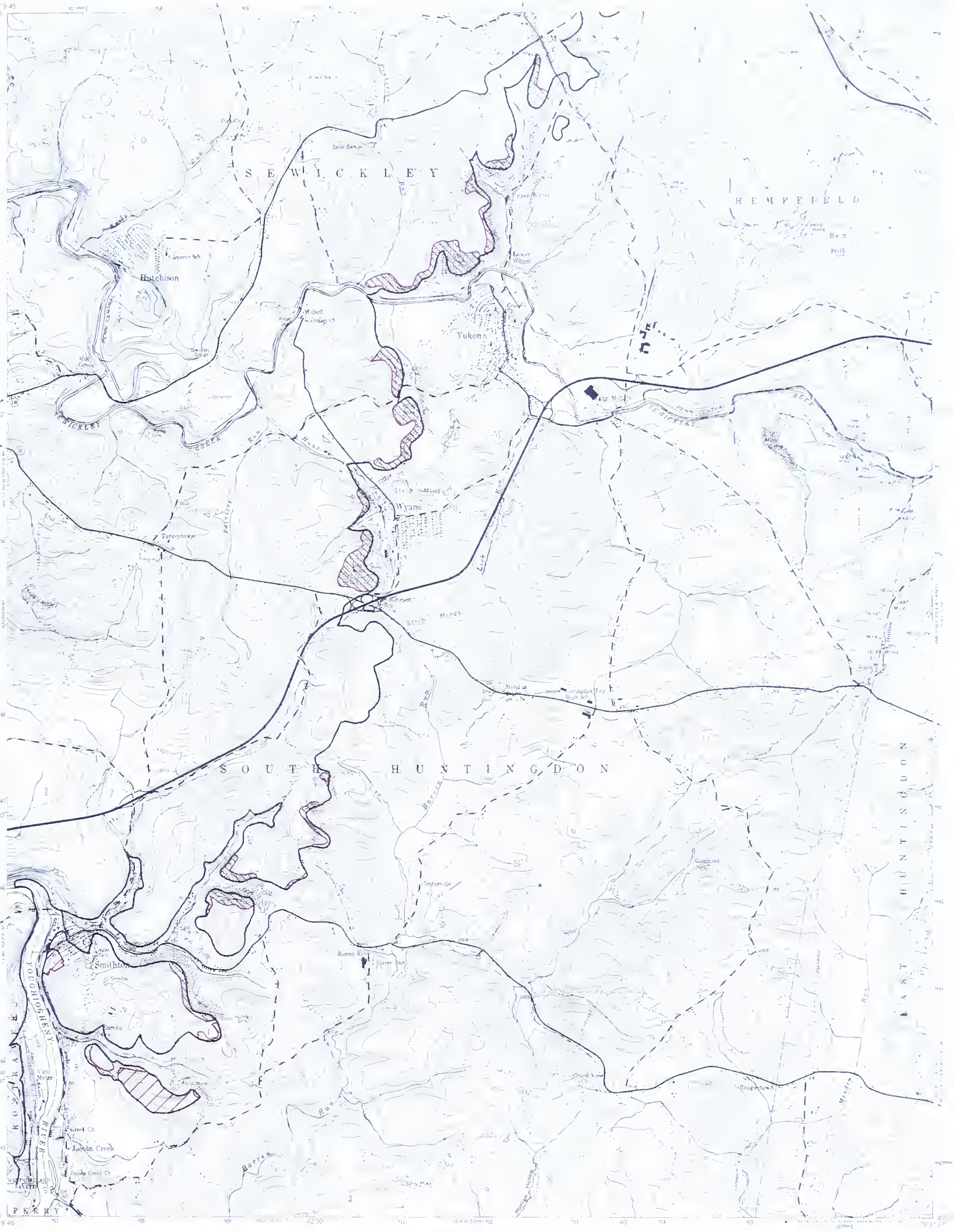
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

～ Crop line of the Redstone coal

▨ Extent of known strip mining

▨ Extent of known deep mining



MAP RELIABILITY

Coal crop line—good
Limits of known strip mining—approximate
Limits of known deep mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Pittsburgh coal compiled from unpublished data.
Limits of strip mining based on interpretation of topographic map and aerial photographs.
Limits of deep mining from unpublished mine maps.

SMITHTON

CROP LINE AND MINED-OUT AREAS OF THE

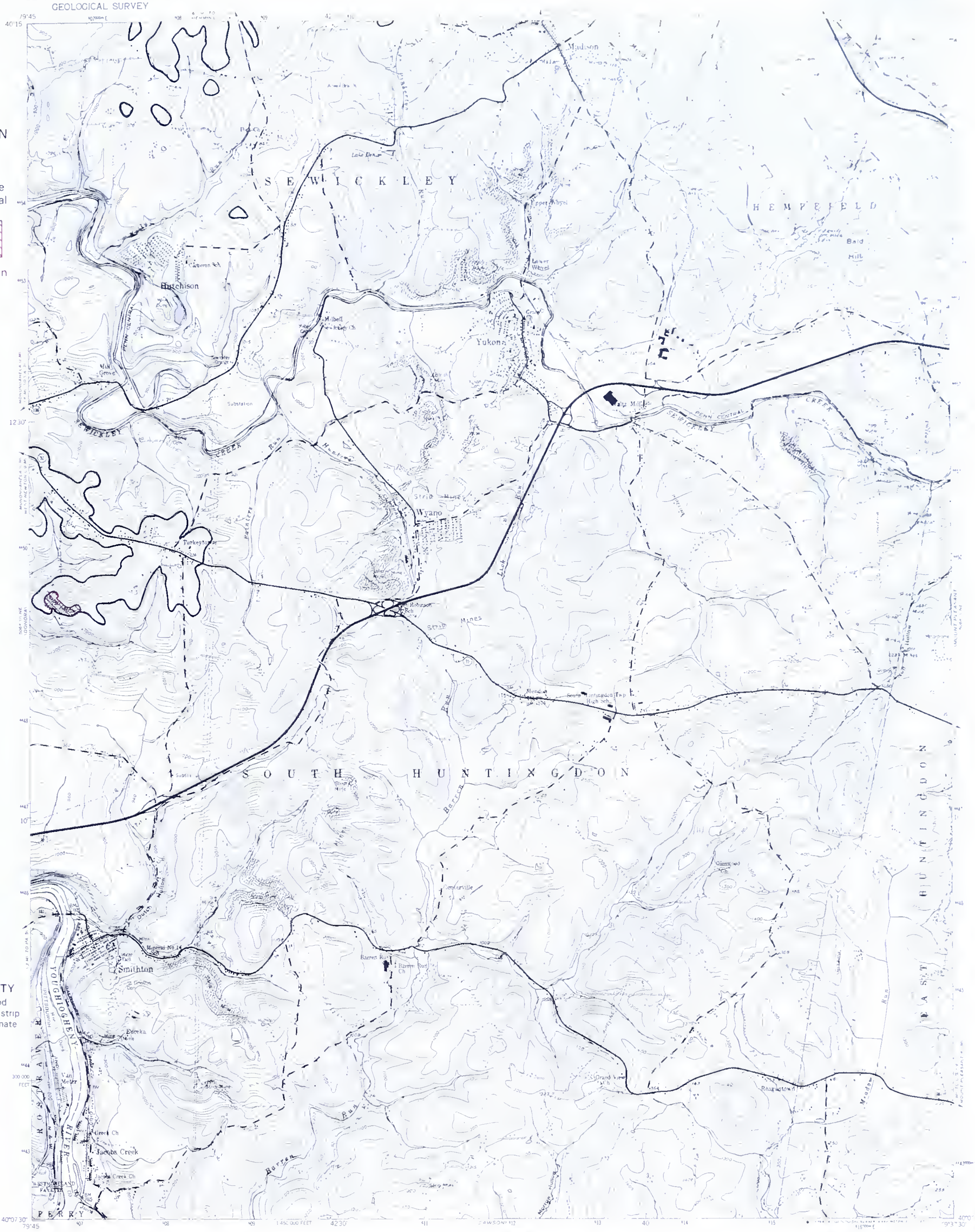
REDSTONE COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

〜 Crop line of the Washington coal

▨ Extent of known strip mining



MAP RELIABILITY

Coal crop line—good
Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Pittsburgh coal compiled from unpublished data. Limits of strip mining based on interpretation of topographic map and aerial photographs.

SMITHTON

CROP LINE AND MINED-OUT AREA OF THE
WASHINGTON COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

CROP LINES

——w—— Washington coal

——wb—— Waynesburg coal

——r—— Redstone coal

——p—— Pittsburgh coal

——lb—— Lower Bakerstown coal

——bc—— Brush Creek coal

——mh—— Mahoning coal

——uf—— Upper Freeport coal

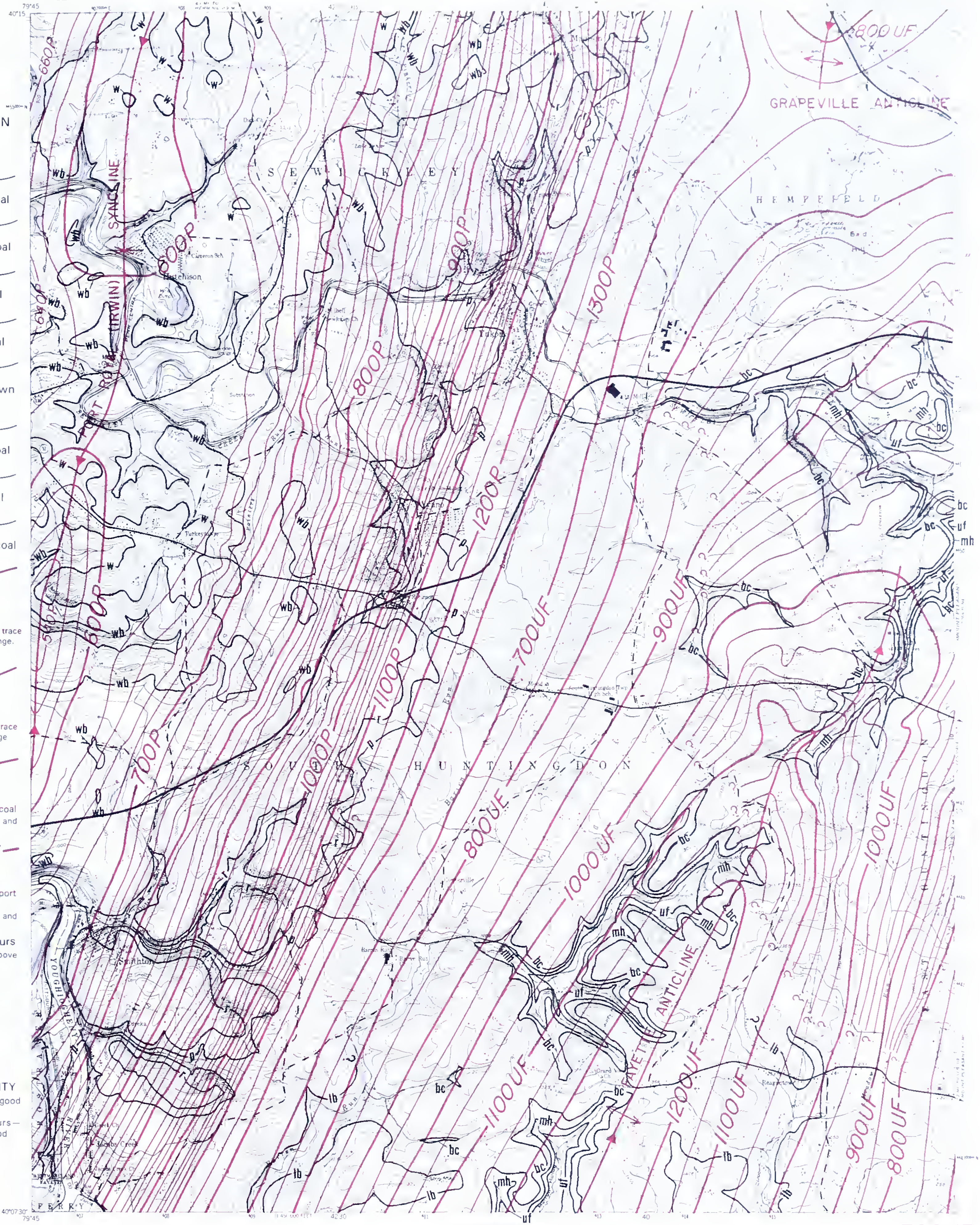
Anticline
Showing axial-plane trace and direction of plunge.

Syncline
Showing axial-plane trace and direction of plunge

—900P—
Base of Pittsburgh coal
Contour intervals 20 and 50 feet.

—700UF—
Base of Upper Freeport coal
Contour intervals 20 and 50 feet.

Structure contours
Altitudes in feet above mean sea level.



MAP RELIABILITY
Coal crop lines—good to very good
Structure contours—good to very good

SOURCES

Crop lines by V. W. Skema based on structure contours and intervals from structure contours.
Structure contours on the Pittsburgh coal compiled by V. W. Skema from unpublished data. Structure contours on the Upper Freeport coal slightly modified by V. W. Skema from Sholes, M. A., Edmunds, W. E., and Skema, V. W. (1979), *The economic geology of the Upper Freeport coal in the New Stanton area of Westmoreland County, Pennsylvania: a model for coal exploration*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 75, 51 p.

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

SMITHTON

COAL CROP LINES AND STRUCTURE CONTOURS

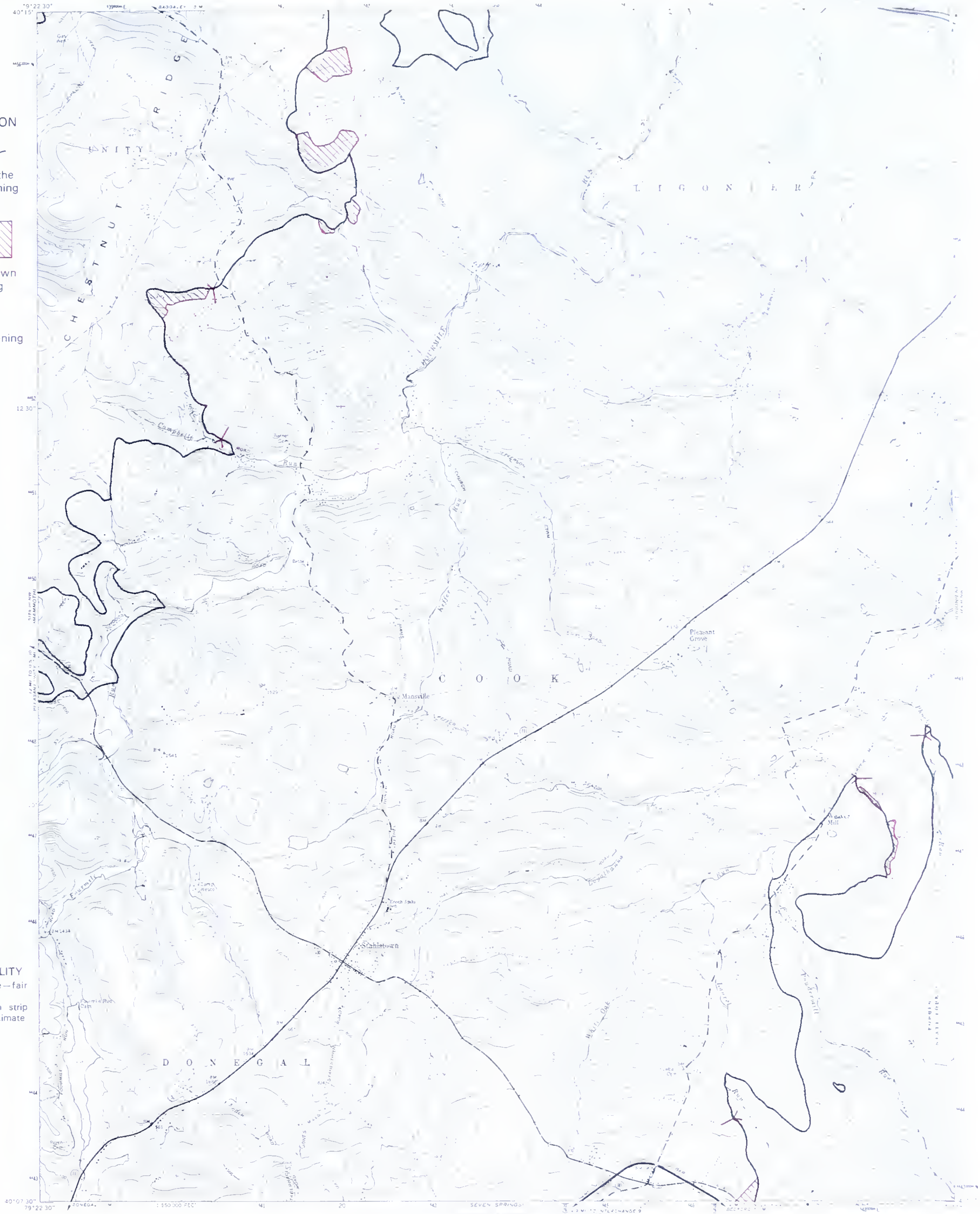
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

Crop line of the Middle Kittanning coal

▨ Extent of known strip mining

Y Deep-mine opening



MAP RELIABILITY
Coal crop line—fair to good
Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Upper Freeport coal compiled from unpublished data.
Limits of strip mining based on interpretation of topographic map and aerial photographs.
Locations of deep-mine openings from Shaffner, M. N. (1963), *Geology and mineral resources of the Donegal quadrangle, Pennsylvania*, Pennsylvania Geological Survey, 4th ser., Atlas 48, 116 p.

STAHLSTOWN

CROP LINE AND MINED-OUT AREAS OF THE
MIDDLE KITTANNING COAL

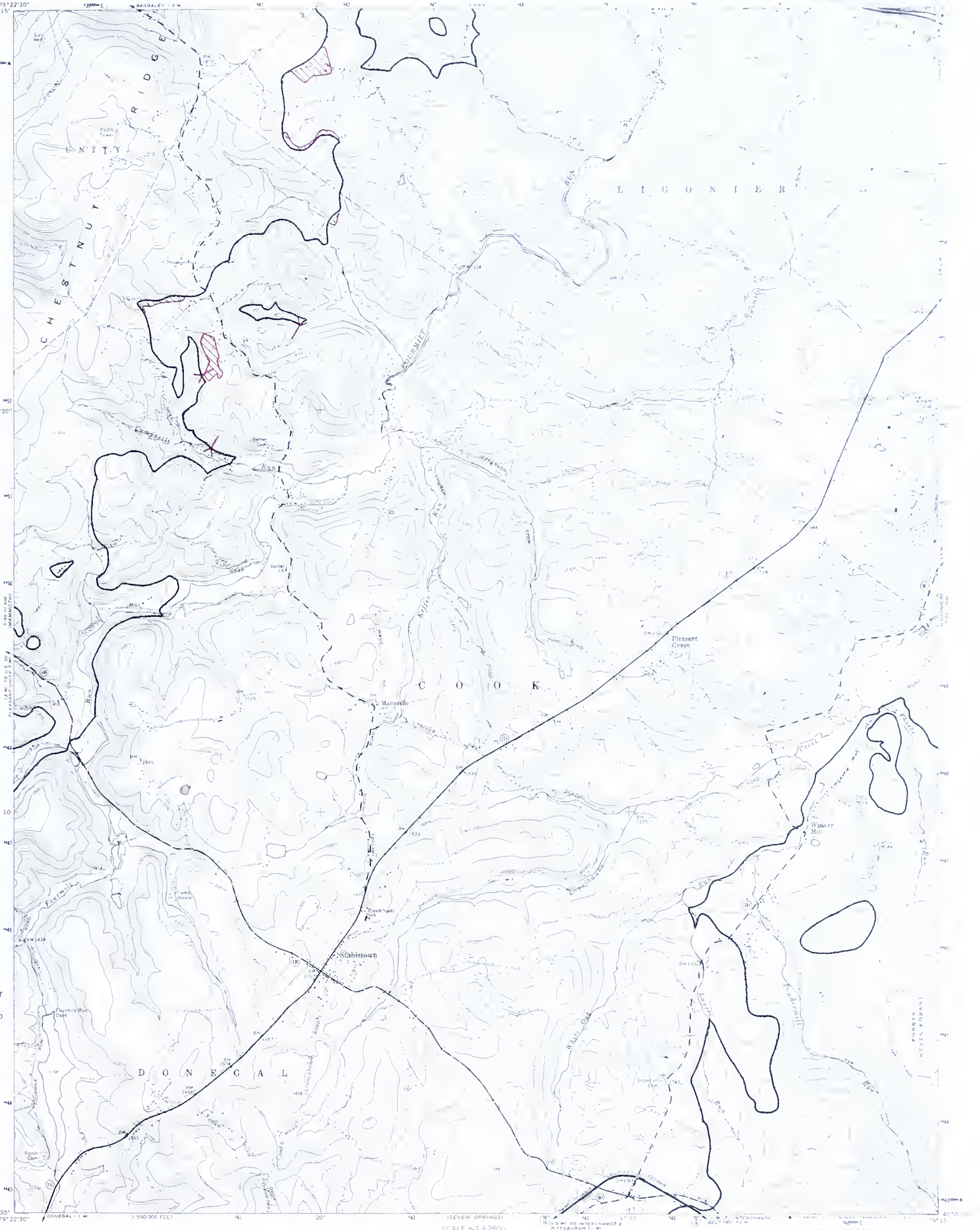
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

Crop line of the Upper Kittanning coal

▨ Extent of known strip mining

Deep-mine opening



MAP RELIABILITY

Coal crop line—fair to good
Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Upper Freeport coal compiled from unpublished data.

Limits of strip mining based on interpretation of aerial photographs.

Locations of deep-mine openings from Shaffner, M. N. (1963), *Geology and mineral resources of the Donegal quadrangle, Pennsylvania*, Pennsylvania Geological Survey, 4th ser., Atlas 48, 116 p.

SCALE ~1 62500

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

ROAD CLASSIFICATION

Primary highway, all weather, hard surface
Light-duty road, all weather, improved surface
Secondary highway, all weather, hard surface
Unimproved road, fair or dry weather
Interstate Route
U. S. Route
State Route

STAHLSTOWN

CROP LINE AND MINED-OUT AREAS OF THE
UPPER KITTANNING COAL

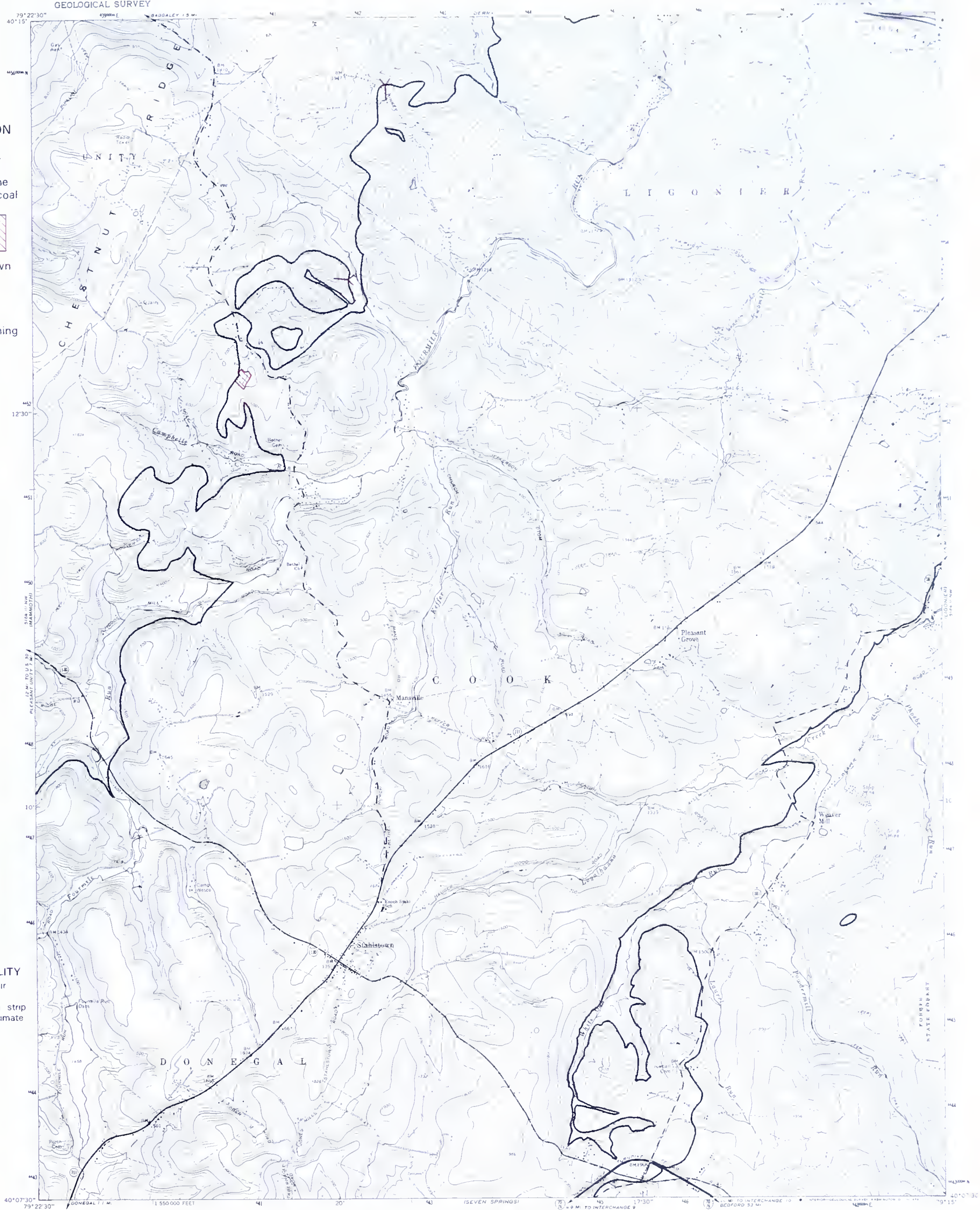
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

〰 Crop line of the Upper Freeport coal

▨ Extent of known strip mining

Y Deep-mine opening



MAP RELIABILITY

Coal crop line—fair to good

Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on structure contours compiled from unpublished data.

Limits of strip mining based on interpretation of aerial photographs.

Locations of deep-mine openings from Shaffner, M. N. (1963), *Geology and mineral resources of the Donegal quadrangle, Pennsylvania*, Pennsylvania Geological Survey, 4th ser., Atlas 48, 116 p.

UTM GRID AND 1973 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE ~1 62500

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

ROAD CLASSIFICATION

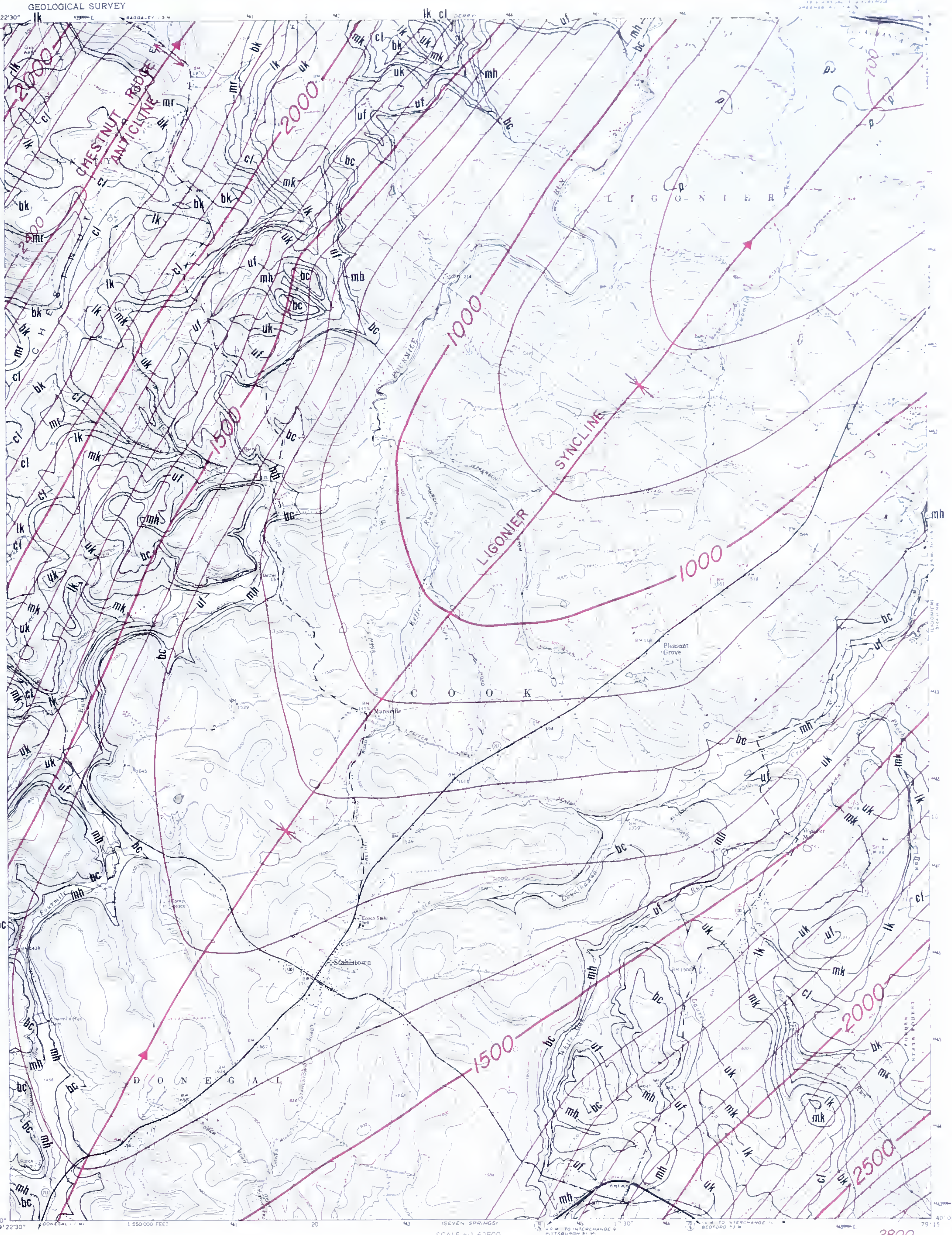
Primary highway, all weather, hard surface	Light-duty road, all weather, improved surface
Secondary highway, all weather, hard surface	Unimproved road, fair or dry weather

Interstate Route   U. S. Route   State Route

STAHLSTOWN

CROP LINE AND MINED-OUT AREAS OF THE UPPER FREEPORT COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



EXPLANATION

CROP LINES

p — Pittsburgh coal

bc — Brush Creek coal

mh — Mahoning coal

uf — Upper Freeport coal

uk — Upper Kittanning coal

mk — Middle Kittanning coal

lk — Lower Kittanning coal

cl — Clarion coal

bk — Brookville coal

mr — Mercer coal

Anticline
Showing axial-plane trace and direction of plunge.

Syncline
Showing axial-plane trace and direction of plunge.

2000
Structure contour
Altitude of the base of the Upper Freeport coal, in feet above mean sea level. Contour interval 100 feet.

Deep-mine opening

MAP RELIABILITY
Coal crop lines—poor to good
Structure contours—poor to good

SCALE ~1 62500

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 KILOMETER

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

UTM GRID AND 1973 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

MN GN 6° 107 MILS 1°05' 19 MILS

PENNSYLVANIA
QUADRANGLE LOCATION

Primary highway, all weather, hard surface	Light-duty road, all weather improved surface
Secondary highway, all weather hard surface	Unimproved road, fair or dry weather

Interstate Route U. S. Route State Route

SOURCES

Crop lines by V. W. Skema based on structure contours and intervals from structure contours.
Structure contours compiled by V. W. Skema from unpublished data
Location of deep-mine opening from Shaffner, M. N. (1963), *Geology and mineral resources of the Donegal quadrangle, Pennsylvania*, Pennsylvania Geological Survey, 4th ser., Atlas 48, 116 p.

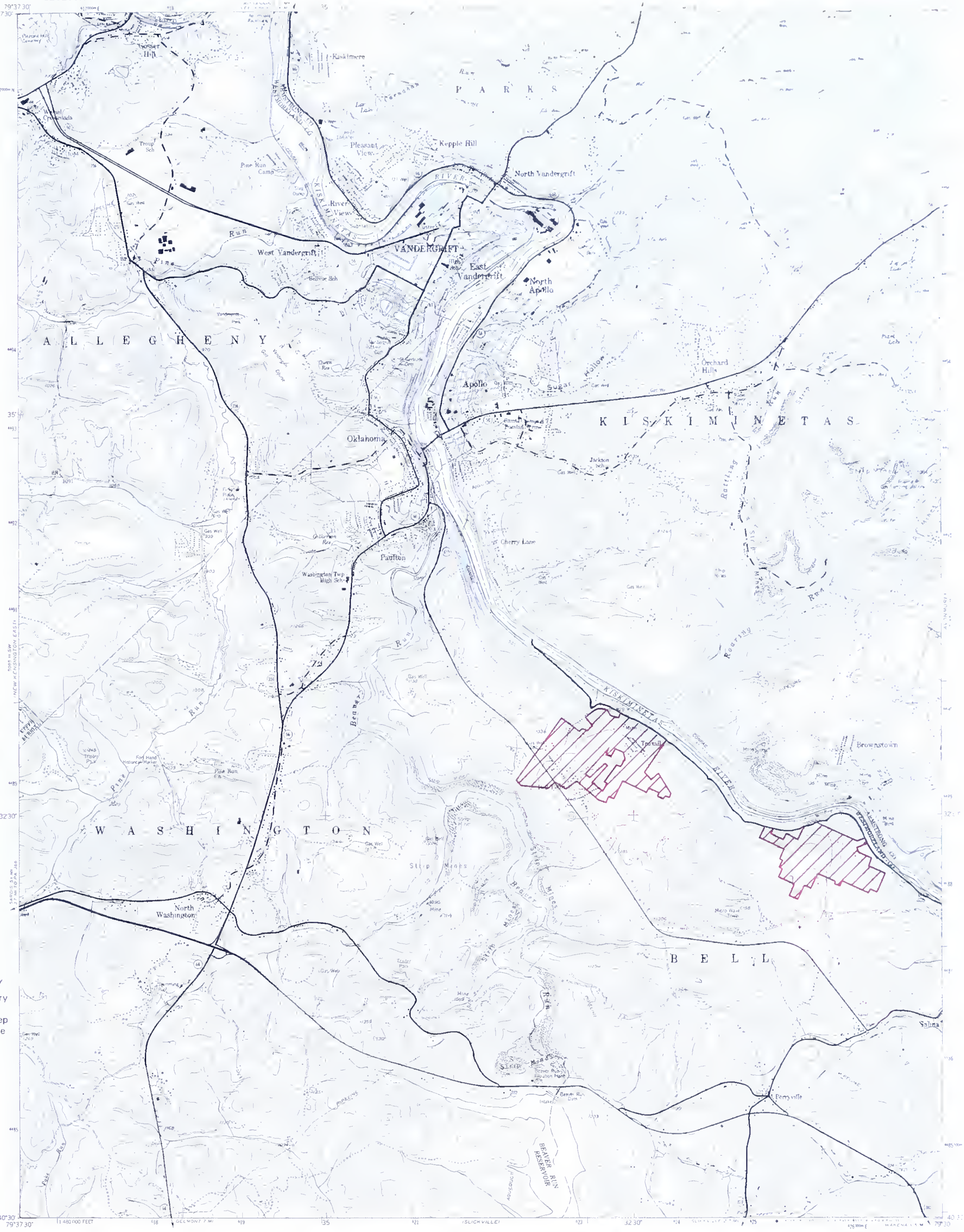
COAL CROP LINES AND STRUCTURE CONTOURS

STAHLSTOWN

EXPLANATION

〰 Crop line of the Lower Kittanning coal

▨ Extent of known deep mining



MAP RELIABILITY

Coal crop line—very good

Limits of known deep mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Upper Freeport coal compiled from unpublished data and extended from adjacent area (Bragonier, W. A. (1986), unpublished map for Vandergrift quadrangle, Armstrong County). Limits of deep mining from unpublished mine maps.

VANDERGRIFT

CROP LINE AND MINED-OUT AREAS OF THE LOWER KITTANNING COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

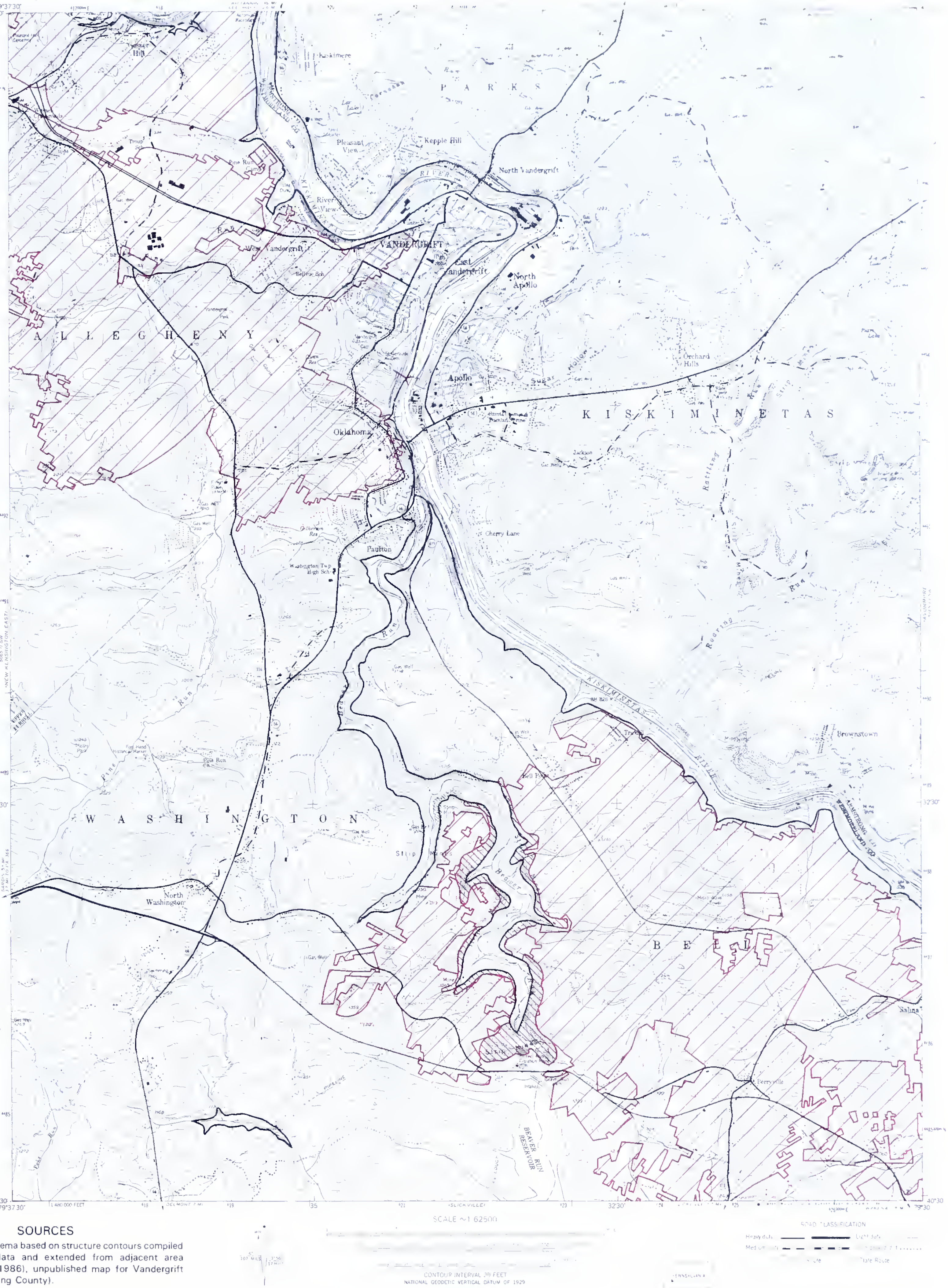
EXPLANATION

~ Crop line of the Upper Freeport coal

▧ Extent of known strip mining

▨ Extent of known deep mining

⅄ Deep-mine opening



MAP RELIABILITY

Coal crop line—very good
Limits of known strip mining—approximate
Limits of known deep mining—approximate

SOURCES

Crop line by V. W. Skema based on structure contours compiled from unpublished data and extended from adjacent area (Bragonier, W. A. (1986), unpublished map for Vandergrift quadrangle, Armstrong County).

Limits of strip mining based on interpretation of topographic map.

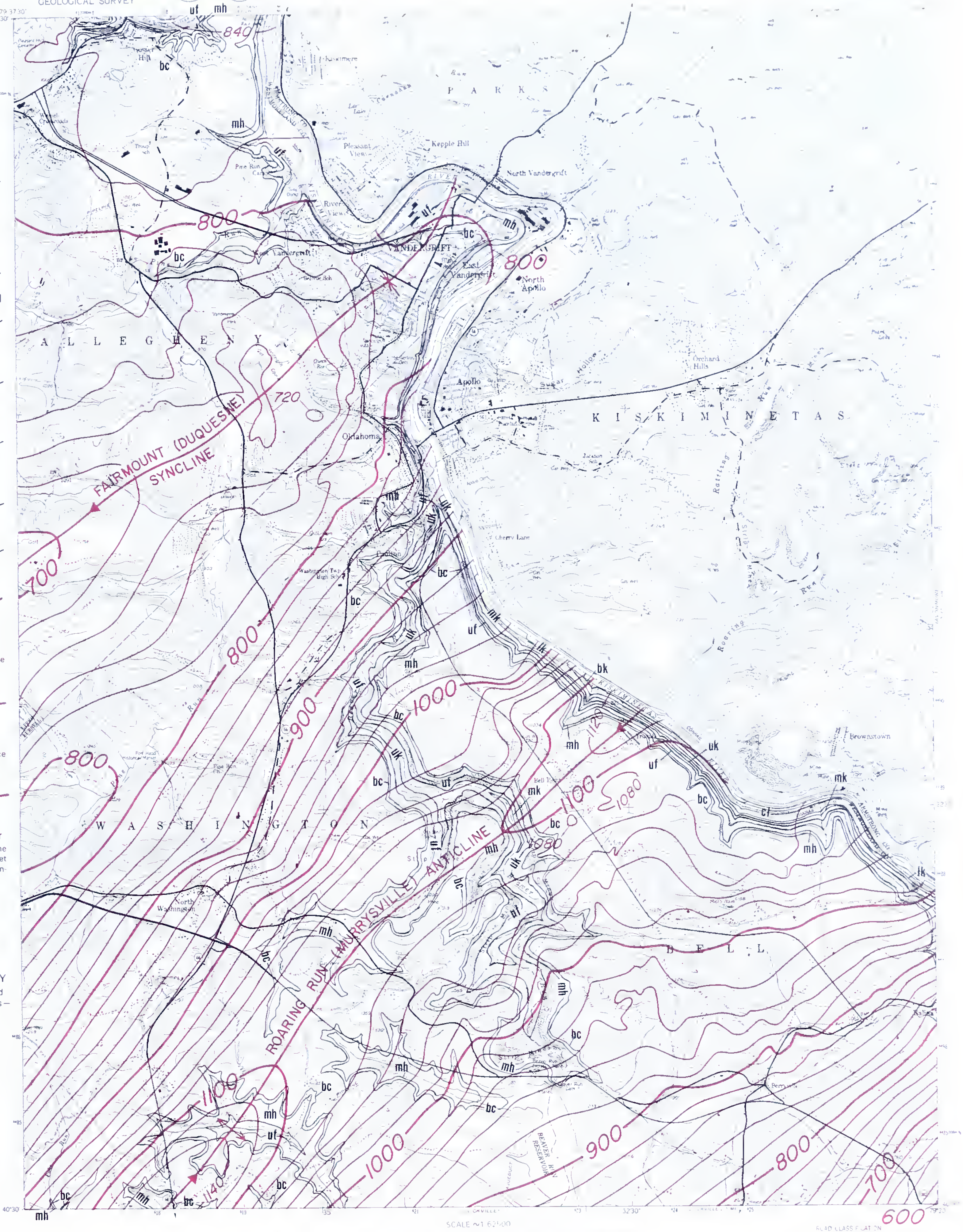
Limits of deep mining from unpublished mine maps.

Location of deep-mine opening from Hughes, H. H. (1933), *Freeport quadrangle—Geology and mineral resources*, Pennsylvania Geological Survey, 4th ser., Atlas 36, 272 p.

VANDERGRIFT

CROP LINE AND MINED-OUT AREAS OF THE
UPPER FREEPORT COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



EXPLANATION

CROP LINES

—bc— Brush Creek coal

—mh— Mahoning coal

—uf— Upper Freeport coal

—uk— Upper Kittanning coal

—mk— Middle Kittanning coal

—lk— Lower Kittanning coal

—cl— Clarion coal

—bk— Brookville coal

Anticline
Showing axial-plane trace and direction of plunge.

Syncline
Showing axial-plane trace and direction of plunge.

—800— **Structure contour**
Altitude of the base of the Upper Freeport coal, in feet above mean sea level. Contour interval 20 feet.

MAP RELIABILITY

Coal crop lines—good
Structure contours—good to very good

SCALE 1:62 500

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

UTM GRID AND 1979 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

QUADRANGLE LOCATION

ROAD CLASSIFICATION

SOURCES

Crop lines by V. W. Skema based on structure contours and intervals from structure contours.
Structure contours compiled by V. W. Skema from unpublished data and contours extended from adjacent area (Bragonier, W. A. (1986), unpublished map for Vandergrift quadrangle, Armstrong County).

VANDERGRIFT

COAL CROP LINES AND STRUCTURE CONTOURS

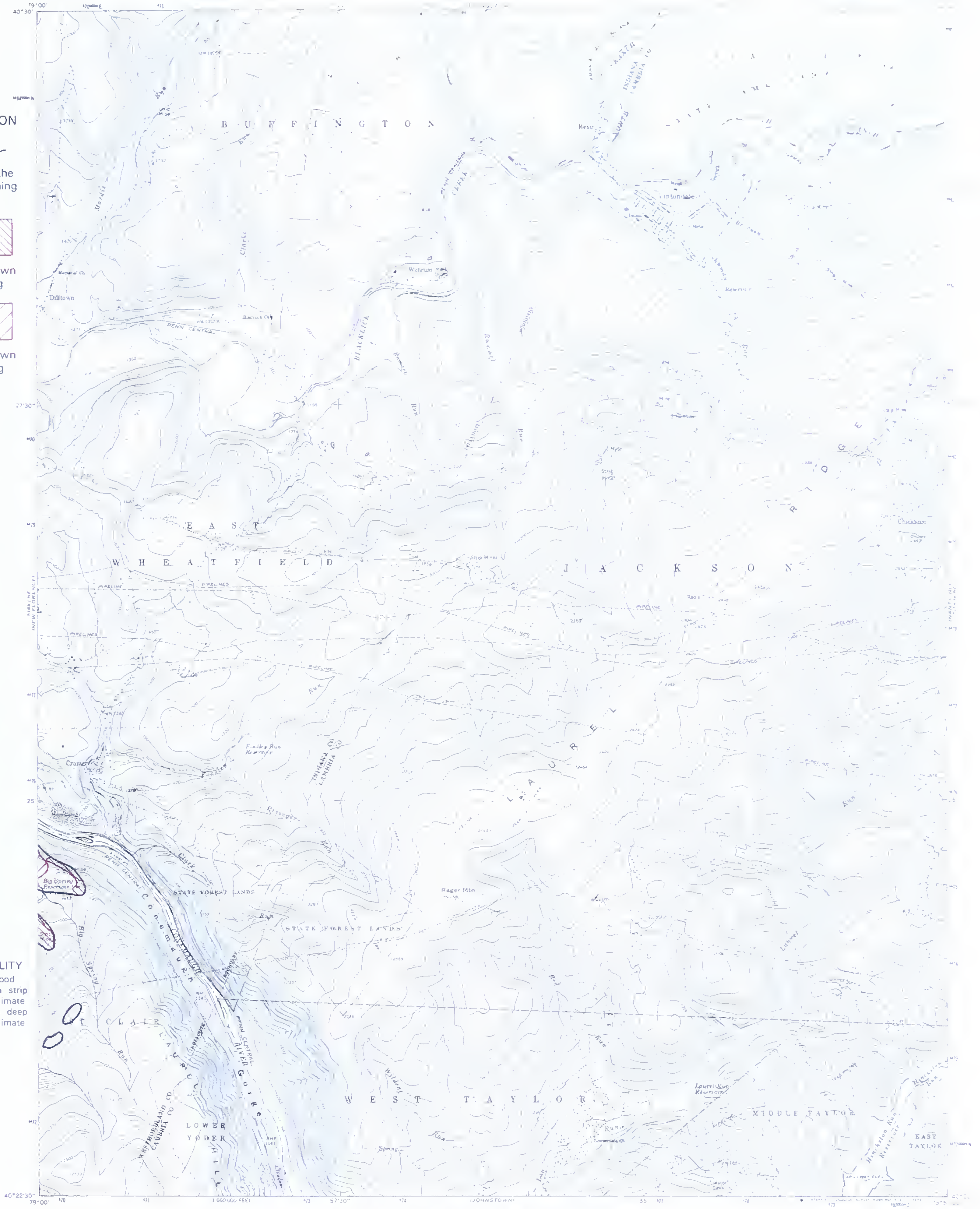
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

〰 Crop line of the Lower Kittanning coal

▨ Extent of known strip mining

▨ Extent of known deep mining



MAP RELIABILITY
Coal crop line—good
Limits of known strip mining—approximate
Limits of known deep mining—approximate

SOURCES

Crop line by V. W. Skema based on structure contours slightly modified from unpublished data.
Limits of strip mining based on interpretation of topographic map.
Limits of deep mining from unpublished mine maps.

SCALE 1:62500

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

UTM GRID AND 1972 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

VINTONDALE

CROP LINE AND MINED-OUT AREAS OF THE
LOWER KITTANNING COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

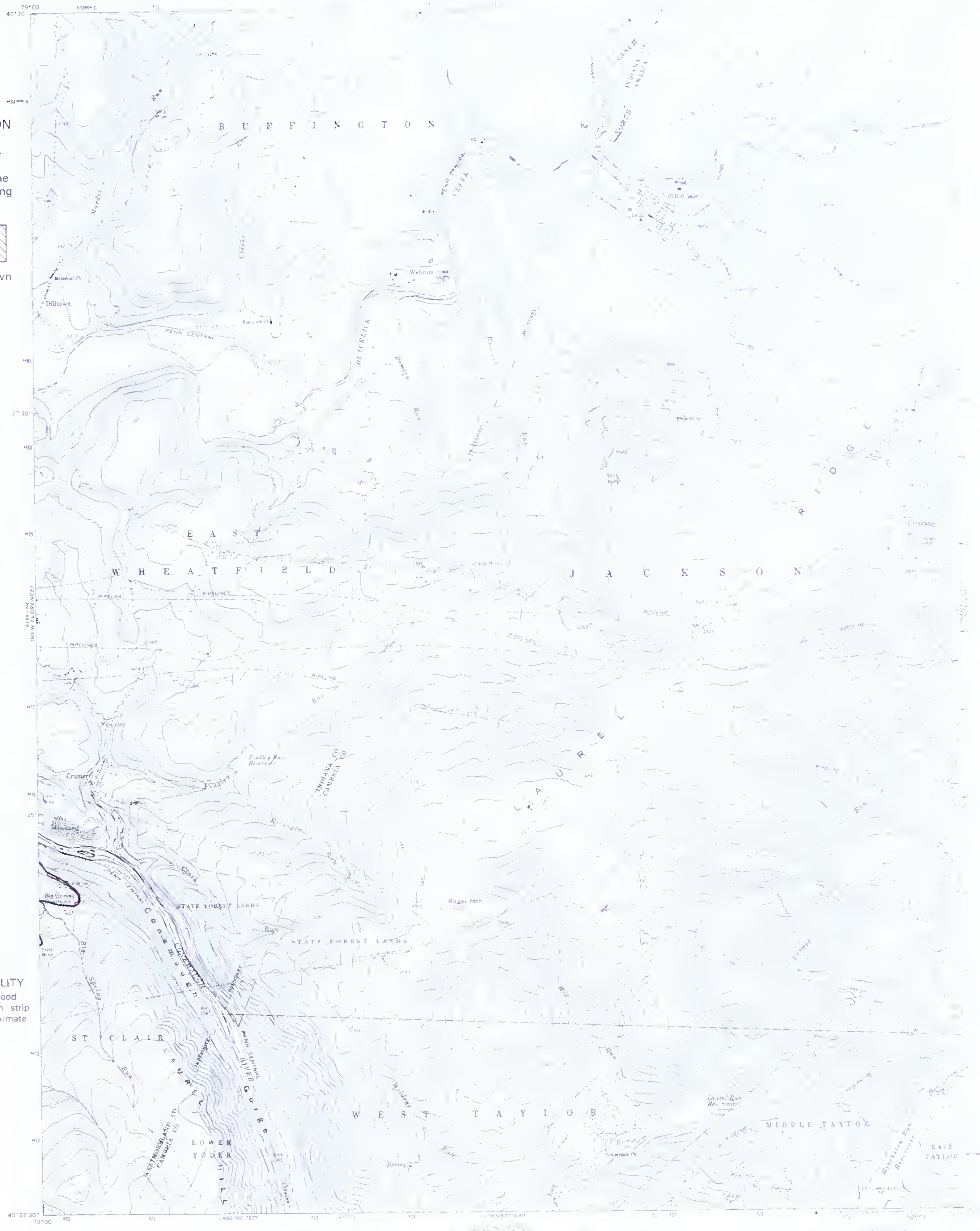
EXPLANATION

〰

Crop line of the Lower Kittanning rider coal

▨

Extent of known strip mining



MAP RELIABILITY

Coal crop line—good
Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Lower Kittanning coal slightly modified from unpublished data.
Limits of strip mining based on interpretation of topographic map.

VINTONDALE

CROP LINE AND MINED-OUT AREAS OF THE
LOWER KITTANNING RIDER COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

CROP LINES

—uk—
Upper Kittanning coal

—mk—
Middle Kittanning coal

—lkr—
Lower Kittanning rider coal

—lk—
Lower Kittanning coal

—cl—
Clarion coal

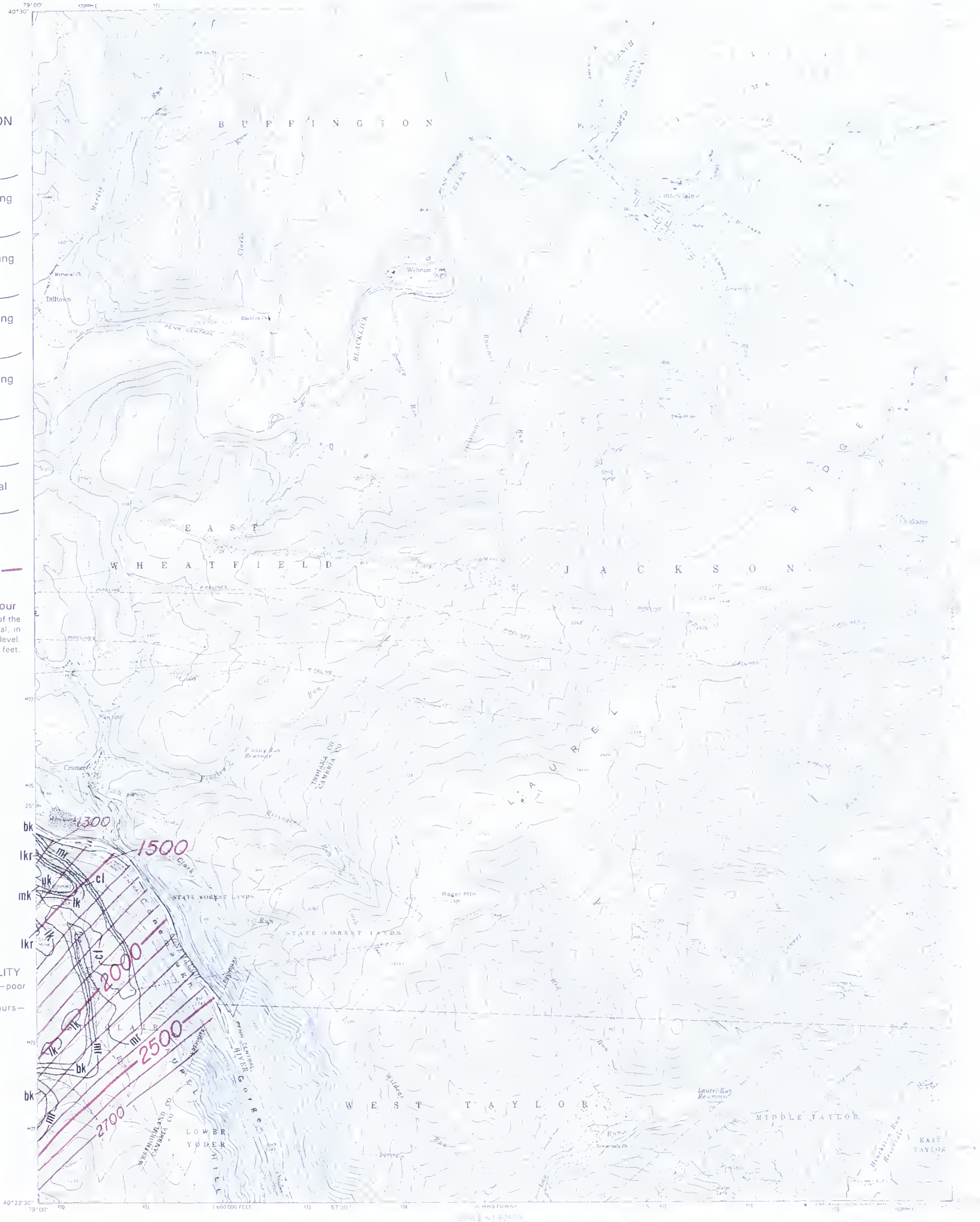
—bk—
Brookville coal

—mr—
Mercer coal

—2000—
Structure contour
Altitude of the base of the Lower Kittanning coal, in feet above mean sea level. Contour interval 100 feet.

MAP RELIABILITY

Coal crop lines—poor to good
Structure contours—poor to good



SOURCES

Crop lines by V. W. Skema based on structure contours and intervals from structure contours.
Structure contours slightly modified by V. W. Skema from unpublished data.

VINTONDALE

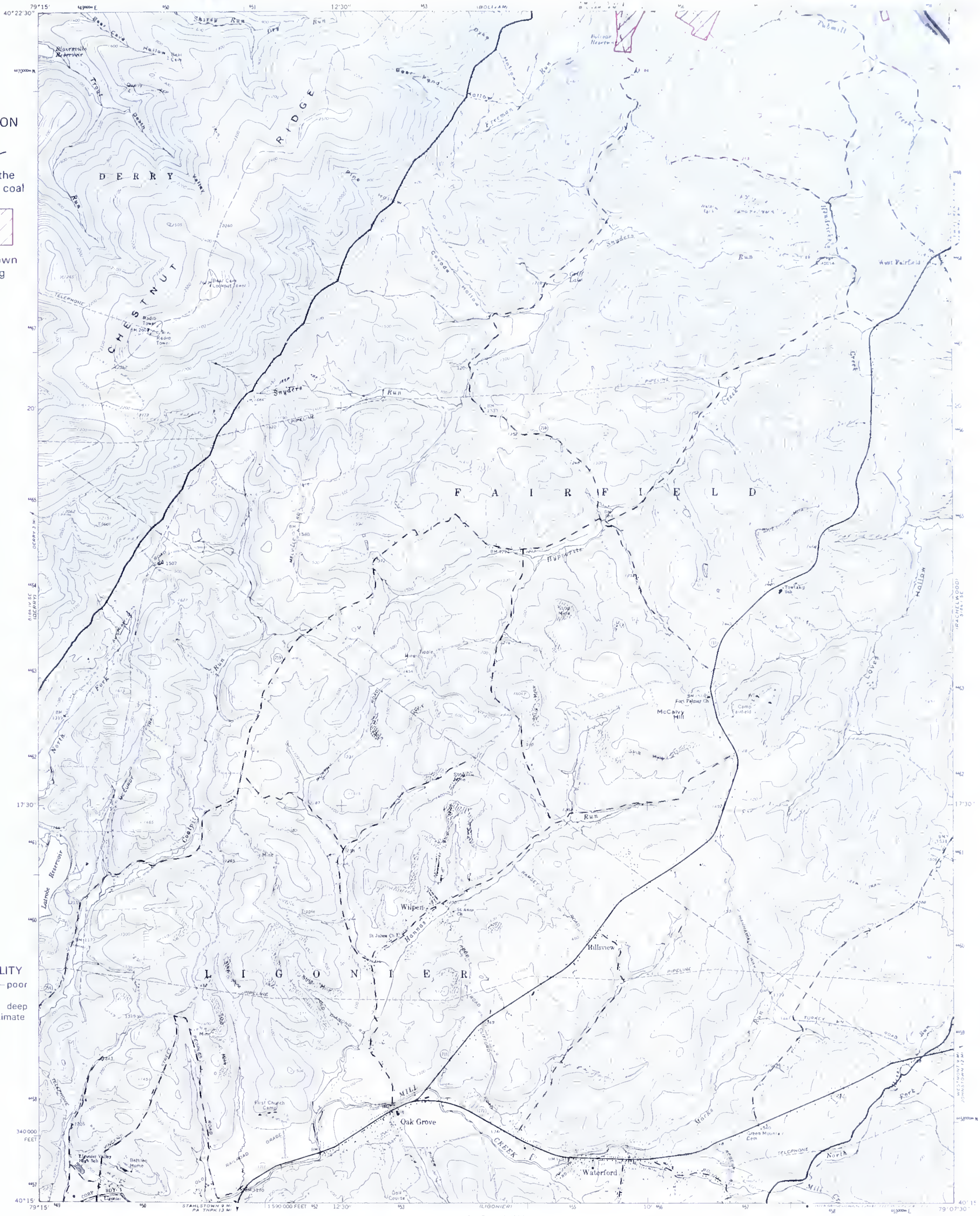
COAL CROP LINES AND STRUCTURE CONTOURS

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

∼ Crop line of the Upper Freeport coal

▨ Extent of known deep mining



MAP RELIABILITY

Coal crop line—poor to fair
Limits of known deep mining—approximate

SOURCES

Crop line by V. W. Skema based on structure contours compiled from unpublished data, and also based on interpretation of aerial photographs.
Limits of deep mining from unpublished mine maps.

UTM GRID AND 1973 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:62500

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION
Heavy duty — Light duty
Medium duty — Unimproved dirt
State Route

QUADRANGLE LOCATION

WILPEN

CROP LINE AND MINED-OUT AREAS OF THE
UPPER FREEPORT COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

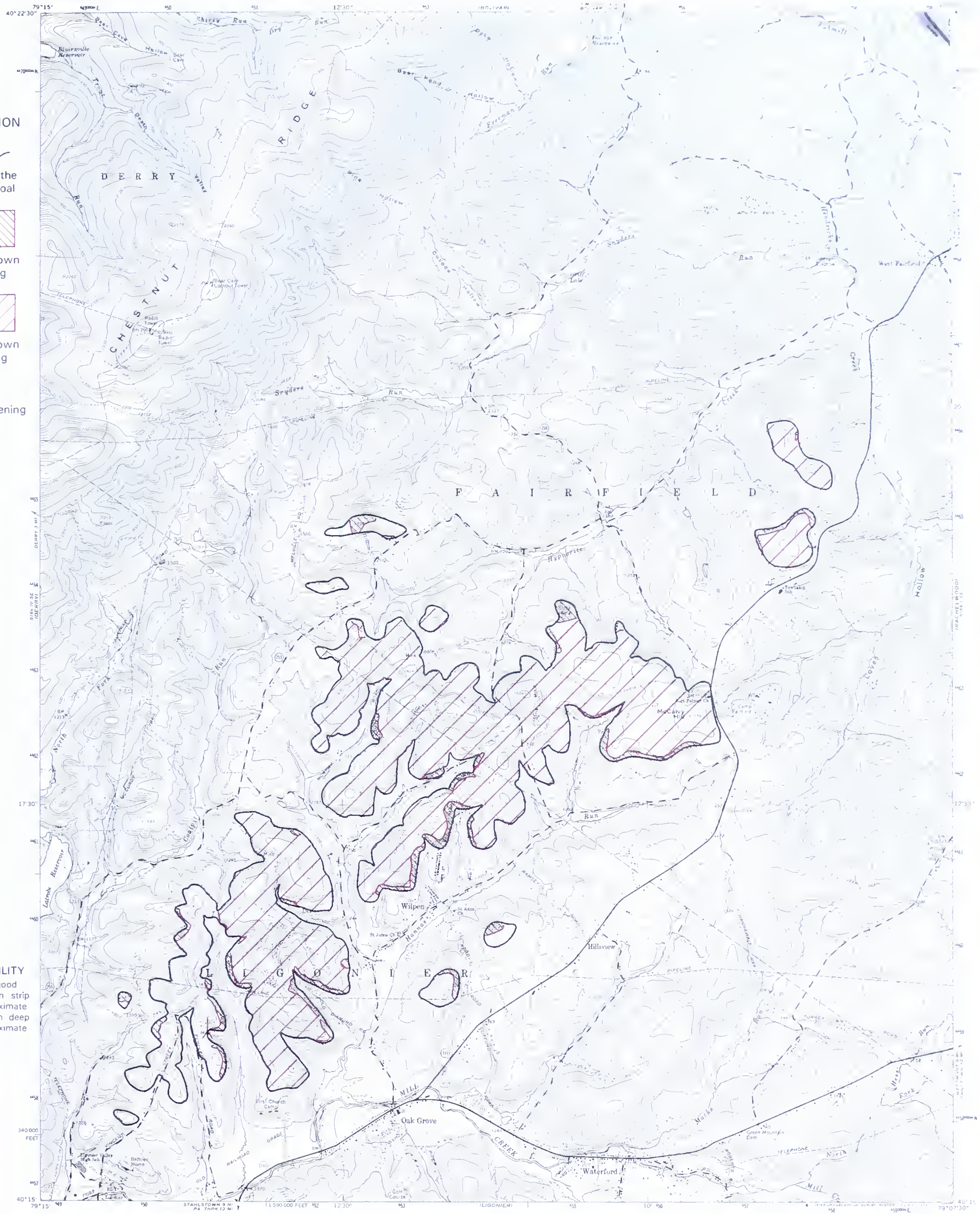
EXPLANATION

Crop line of the Pittsburgh coal

▨ Extent of known strip mining

▨ Extent of known deep mining

Deep-mine opening



MAP RELIABILITY

Coal crop line—good
Limits of known strip mining—approximate
Limits of known deep mining—approximate

SOURCES

Crop line by V. W. Skema based on structure contours compiled from unpublished data.
Limits of strip mining based on interpretation of topographic map.
Limits of deep mining from unpublished mine maps.
Location of deep-mine opening from topographic map.

WILPEN

CROP LINE AND MINED-OUT AREAS OF THE

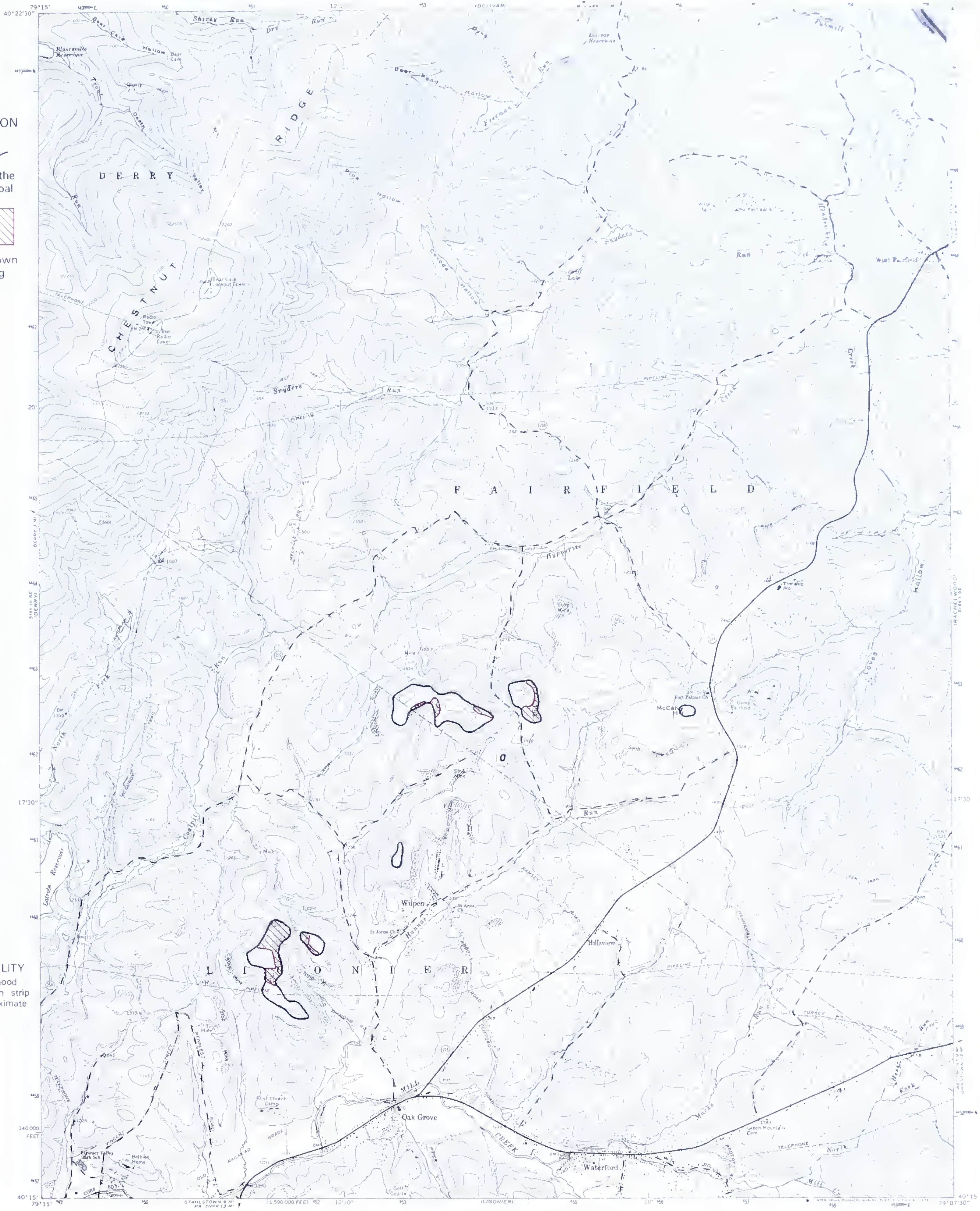
PITTSBURGH COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EXPLANATION

Crop line of the Sewickley coal

▨ Extent of known strip mining



MAP RELIABILITY
Coal crop line—good
Limits of known strip mining—approximate

SOURCES

Crop line by V. W. Skema based on interval from structure contours on the Pittsburgh coal compiled from unpublished data. Limits of strip mining based on interpretation of topographic map.

WILPEN

CROP LINE AND MINED-OUT AREAS OF THE
SEWICKLEY COAL

EXPLANATION

CROP LINES

—s— Sewickley coal

—p— Pittsburgh coal

—bc— Brush Creek coal

—mh— Mahoning coal

—uf— Upper Freeport coal

—uk— Upper Kittanning coal

—mk— Middle Kittanning coal

—lk— Lower Kittanning coal

—cl— Clarion coal

—bk— Brookville coal

—mr— Mercer coal

Anticline
Showing axial-plane trace and direction of plunge

Syncline
Showing axial-plane trace and direction of plunge

—1500 P—
Base of Pittsburgh coal
Contour intervals 20, 60, and 80 feet

—2500 UF—
Base of Upper Freeport coal
Contour interval 100 feet.

—1000 LK—
Base of Lower Kittanning coal
Contour interval 100 feet

Structure contours
Altitudes in feet above mean sea level.

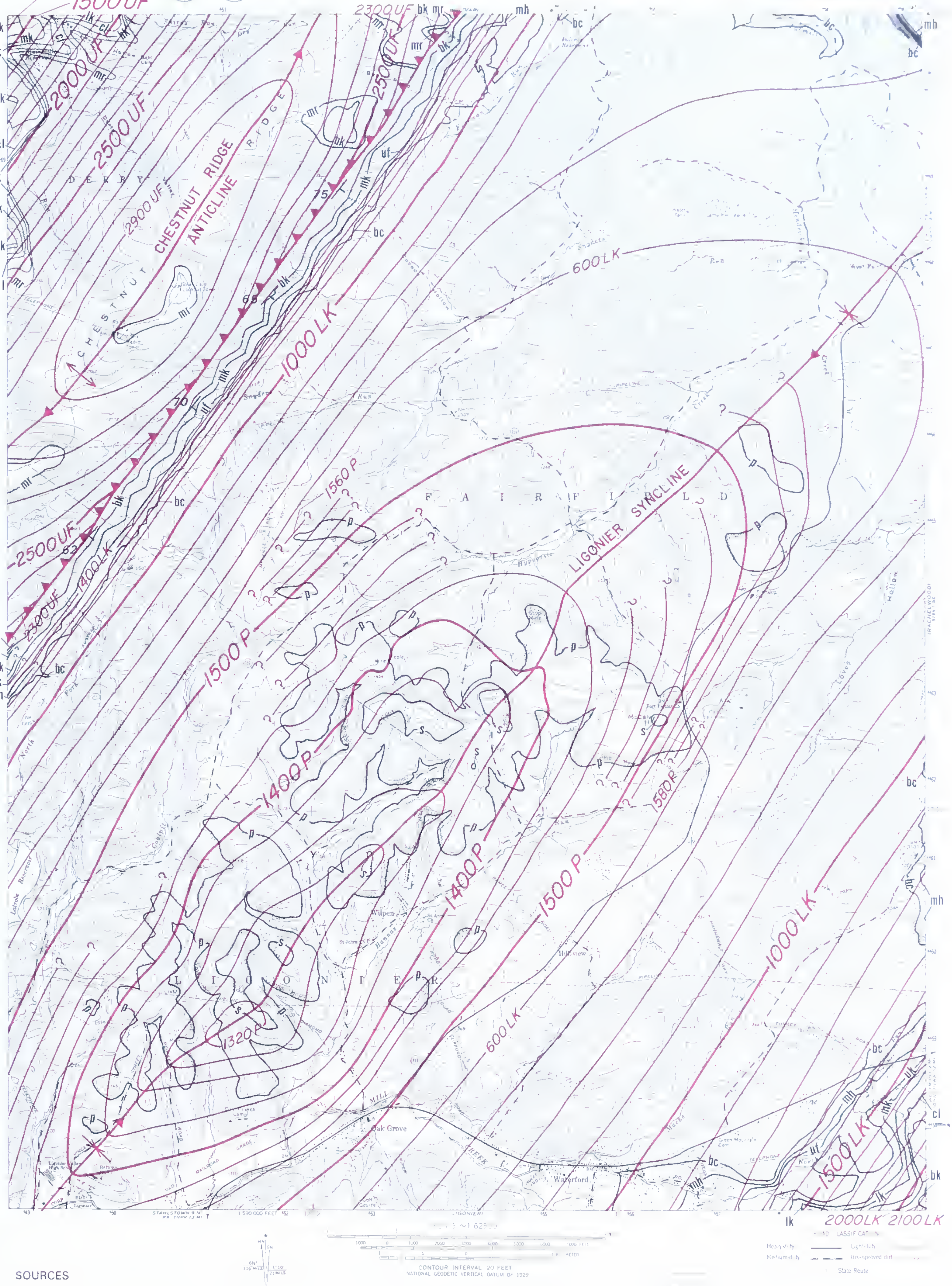
75
Strike and dip of beds

Reverse fault
High-angle fault. Sawteeth on upper plate.

Note: Because of lack of information and closeness of crop lines, only the stratigraphically important and potentially economic coal horizons are shown along the fault.

MAP RELIABILITY

Coal crop lines—poor to good
Structure contours—poo to good



SOURCES

Crop lines by V. W. Skema based on structure contours and intervals from structure contours, and interpretation of aerial photographs. Structure contours on the Pittsburgh and Upper Freeport coals compiled by V. W. Skema from unpublished data. Structure contours on the Lower Kittanning coal compiled by V. W. Skema from unpublished data and modified from Shaffner, M. N. (1958), *Geology and mineral resources of the New Florence quadrangle, Pennsylvania*, Pennsylvania Geological Survey, 4th ser., Atlas 57, 165 p.

Strike and dip of beds from Shaffner (1958).

Position of reverse fault from Berg, T. M., and Dodge, C. M., compilers and editors (1981), *Atlas of preliminary geologic quadrangle maps of Pennsylvania*, Pennsylvania Geological Survey, 4th ser., Map 61, p. 622.

COAL CROP LINES AND STRUCTURE CONTOURS

WILPEN